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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PLANT INDUSTRY

Division of Cereal Crops and Diseases

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COMPARISON OF

WINTER-WHEAT VARIETIES GROWN IN COOPERATIVE

PLOT AND NURSERY EXPERIMENTS IN THE

HARD RED WINTER-WHEAT REGION

IN 1933

Washington, D. C.

March 1, 1934.

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry

COMPARISON OF WINTER-WHEAT VARIETIES GROWN IN COOPERATIVE PLOT AND
NURSERY EXPERIMENTS IN THE HARD RED WINTER-WHEAT REGION

IN 1933

By

K. S. Quisenberry, ^{1/} Agronomist, Wheat Investigations, Division of Cereal Crops
and Diseases

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EXPERIMENTS IN 1933

The cooperative winter-wheat improvement program as outlined in the 1931 and 1932 reports was continued at the various cooperating stations in 1933. No changes were made in the lists of uniform varieties grown in either plot or nursery experiments. At all stations, however, changes are constantly being made in the varieties included in plot and nursery tests.

The cooperating agencies, stations, and personnel concerned in these experiments are as follows:

^{1/} The writer wishes to express his appreciation to Mr. C. G. Colcord, scientific aide, who calculated all of the probable errors, and assisted in assembling the data.

COOPERATING AGENCIES, STATIONS, AND PERSONNEL

(The asterisk (*) indicates Government field stations)

BUREAU OF PLANT INDUSTRY

Division of Cereal Crops and Diseases

M. A. McCall

Wheat Investigations
Hard Red Winter Wheat

S. C. Salmon
K. S. Quienberry

TEXAS AGRICULTURAL EXPERIMENT STATION

Agronomy (Corn and Small Grain)

P. C. Mangelsdorf

Denton Substation No. 6
Amarillo Price Memorial College

I. M. Atkins
I. M. Atkins

OKLAHOMA AGRICULTURAL EXPERIMENT STATION

Field Crops and Soils

N. E. Winters

*Lawton U. S. Dry Land Field Station
Stillwater A. and M. College
Carrier Carrier Experimental Farm
*Woodward Southern Great Plains Field Station
Goodwell Panhandle Agr. Exp. Station

W. M. Osborn
C. B. Cross
C. B. Cross
Edmund Stephens
H. H. Finnell

KANSAS AGRICULTURAL EXPERIMENT STATION

Agronomy

R. I. Throckmorton

Manhattan Kansas State College
Hays Ft. Hays Branch Experiment Station
Colby Colby Branch Station

H. H. Laude
A. F. Swanson
Embert Coles

COLORADO AGRICULTURAL EXPERIMENT STATION

Agronomy

Alvin Kezer and
D. W. Robertson
J. J. Curtis

*Akron U. S. Dry Land Field Station 1/

NEBRASKA AGRICULTURAL EXPERIMENT STATION

Agronomy (Experimental)

T. A. Kiesselbach

Lincoln Agr. Exp. Station 1/
North Platte North Platte Substation 1/
Alliance Box Butte Experiment Farm
Valentine Valentine Substation

N. E. Jodon and Boyd Faulkner
C. A. Suneson
E. M. Brouse

WYOMING AGRICULTURAL EXPERIMENT STATION

Archer Cheyenne Experiment Farm 1/
*Sheridan U. S. Dry Land Field Station 1/

A. L. Nelson
R. S. Towle

MINNESOTA AGRICULTURAL EXPERIMENT STATION

Agronomy and Plant Genetics

Waseca Southeast Experiment Station

H. K. Hayes and
H. K. Wilson
R. E. Hodgson

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agronomy

*Redfield United States Field Station 1/

A. N. Hume
E. S. McFadden

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agronomy

Dickinson Dickinson Substation

H. L. Walster
R. W. Smith

MONTANA AGRICULTURAL EXPERIMENT STATION

Agronomy

*Huntley Huntley Field Station 1/
Bozeman Montana Experiment Station
Moccasin Judith Basin Branch Station
Havre Northern Montana Branch Station

Clyde McKee
A. E. Seamans
Austin Goth and L. P. Reitz
J. L. Sutherland
M. A. Bell

1/ Cooperation with the Divisions of Dry Land Agriculture, Forage Crops and Diseases, or Western Irrigation Agriculture, all of the Bureau of Plant Industry, as well as with the State experiment stations.

UNIFORM VARIETIES IN PLOTS

Because of the wide variation in environment encountered in the region from Texas to Montana, it has not seemed advisable to grow uniformly the same 10 varieties at all stations. The region has therefore been divided into three districts, as shown by the map on the following page, and different lists of 10 varieties (11 in the southern district) were grown uniformly at the experiment stations in each of these three districts. There is some repetition of varieties between districts, and three varieties, Kharkof (C. I. 1442), Nebraska No. 60, and Kanred were grown uniformly throughout the region. This is the same plan as followed for the last two years.

The uniform varieties in each district are as follows:

Southern	Central	Northern			
Variety	C.I.No.	Variety	C.I.No.	Variety	C.I.No.
<u>Hard Red:</u>					
Kharkof	1442	Kharkof	1442	Kharkof	1442
Kanred	5146	Kanred	5146	Kanred	5146
Nebraska No. 60	6250	Nebraska No. 60	6250	Nebraska No. 60	6250
Tenmarq	6936	Tenmarq	6936	Minturki	6155
Blackhull	6251	Blackhull	6251	Minhardi x Minturki	
Quivira	8886	Quivira	8886	Minturki	8034
<u>Soft Red:</u>					
		Minturki	6155	Do	8215
Nebraska No. 28	5147	Oro	8220	Yogo	8033
Fulcaster	6471	Cheyenne	8885	Minard x Minhardi	
Harvest Queen	6199	Kharkof (Hays No.2)	6686		8889
Denton	8265			Karmont	6700
Kawvale	8180			Newturk	6935

NORTHERN

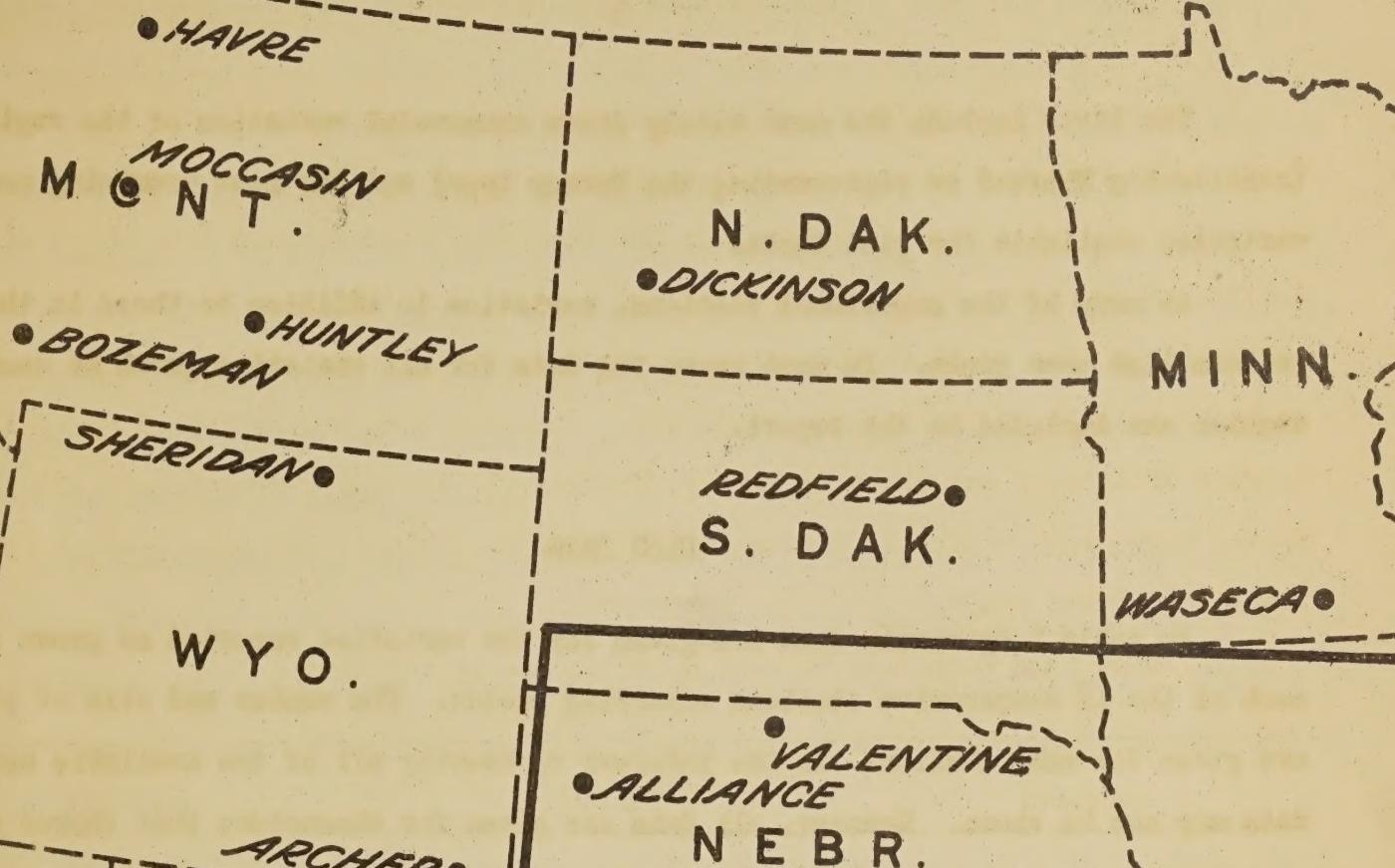
CENTRAL

SOUTHERN

NORTHERN

CENTRAL

SOUTHERN



T E X .

The lists include the most widely grown commercial varieties of the region (considering Kharkof as representing the Turkey type) and the most promising new varieties available for plot tests.

At many of the experiment stations, varieties in addition to these in the uniform list were grown. In most cases the data for all varieties grown at each station are included in the report.

PLOT DATA

In table 1 agronomic data are given for the varieties reported as grown at each of the 18 cooperative stations reporting yields. The number and size of plots are given for each station. In the interest of brevity all of the available agronomic data may not be shown. However, all data are given for characters that showed a contrasting reaction and that ~~may~~ have had an influence on yield. For each station the varieties are listed in order of yield for 1933.

The data need little explanation. In general the results are neither so extensive nor so conclusive as those obtained the past two years. In general, the season was characterized by an extremely dry fall conducive to poor stands. This was then followed by rather severe winterkilling at the northern stations, and because of a dry spring, recovery was poor. On the southern plains soil blowing was very bad. Where the crop was still standing, hot and continued dry weather just prior to harvest greatly reduced yields and injured the quality of the grain.

Plots were seeded at 24 stations in the fall of 1932. At 6 Stations - Amarillo, Goodwell, Colby, Valentine, Redfield, and Archer - the crop was completely killed or there was so little stand left that harvest was out of the question.

At Denton, an early winter freeze caused some damage to the less hardy varieties. The data reported in the table more nearly represents the surviving tissue of the plants than surviving plants, as very few plants were completely killed. Heavy epidemics of leaf and stem rust had considerable influence on yield.

The hot, dry weather hastened maturity at Stillwater and Carrier. At both these Stations the earlier varieties did better than during the past two years. Harvest Queen ranked second at Carrier, the best showing made by this variety.

The results at Woodward are worthy of note because of the unusually hot, dry season. Early Blackhull ranked first, followed by Cheyenne, Oro, and Kharkof (Hays No. 2). It would have been expected that other early varieties, such as Nebraska No. 28, Quivira, Tenmarq, and Blackhull, would give better yields than they did. It is apparent from the low test weights that Quivira and Tenmarq were in a critical stage when the severe weather started and were more severely injured than either the earlier or later ones.

At Manhattan, the yields of most of the hard wheats were reduced by the hot weather. The four soft wheats were seeded on different ground and in a more protected place and, as a result, yielded much more than did the hard wheats. Kanred checks among the soft wheats averaged 44.8 bushels per acre compared with 32.5 in the hard-wheat test.

The correlation between earliness and yield is very good at Hays. Here the higher yielding varieties were the earliest ones, and the later varieties ranked lowest for yield.

At Akron, yields were obtained on corn ground only and at North Platte on fallow only. At Lincoln, in addition to the dry weather, chinch bugs contributed to some extent to the low yields and test weights.

Tenmarq and Quivira, although low in winter survival at Alliance yielded highest. Probably these yields are a little higher than they should be as it so happened that the plots of these varieties fell in favored locations.

At Moccasin and Havre, winterkilling seemed to be a very important factor in determining yield. Dry weather at both of these stations also influenced yields to some extent, as did weed growth in the thin stands.

In the right hand columns of table 1 are shown the average yields and ranks of the varieties for the 3 years or shorter periods during which yields have been reported.

Table 1. - Agronomic data for winter-wheat varieties grown in replicated plots in cooperative experiments at 18 experiment stations in the winter-wheat area in 1933, and average yields for 1931 to 1933.

Denton, Texas

(Four 1/55th-acre plots; seeded Oct. 7, 1932; emerged Oct. 14, 1932)

Variety	T. S. No.	C. I. No.	Win- ter- sur- vival (P. ct.)	Dates Headed Ripe (In.)	Shat- ting Leaf Stem (P. ct.)	Rust Test weight per bu. (Lbs.)	Acre yield (Bu.)	Av. Acre Yield	
								1932-33	
								Bu.	Rank
White Mediterranean	15834	10023	83	5/ 3	6/ 8	37	61.0	32.9	30.4
Denton	--	8265	88	5/ 9	6/ 6	40	60.5	32.4	31.5
Quivira	--	8886	81	5/ 8	6/ 7	36	61.5	32.1	33.3
Tenmarq	--	6936	86	5/ 10	6/ 7	36	60.0	31.3	31.7
Kanred	--	5146	91	5/ 16	6/ 4	38	59.5	31.0	30.1
Mediterranean sel.	5933-32	--	8180	92	5/ 5	6/ 4	36	56	29.2
Kawvale	5933-20	10085	92	5/ 5	6/ 4	36	60.0	30.8	30.8
Mediterranean sel.	5933-34	11526	92	5/ 5	6/ 4	37	59.0	30.3	30.9
do	5933-23	11525	92	5/ 5	6/ 4	39	60.0	29.2	30.0
do	6471	--	89	5/ 9	6/ 7	37	61.0	29.2	30.6
Fulcaster	5933-38	--	92	5/ 9	6/ 7	37	61.0	29.1	29.7
Mediterranean sel.	--	6251	89	5/ 12	6/ 9	35	55	24.9	27.7
Blackhull	--	1442	95	5/ 12	6/ 9	36	51	60.0	30.1
Kharkof	3015-81	10086	79	5/ 8	6/ 9	37	73	15	17
Mediterranean sel.	--	6199	93	5/ 10	6/ 8	40	55	59.5	27.4
Harvest Queen	3015-72	11567	82	5/ 12	6/ 8	37	68	55	25.2
Mediterranean sel.	--	6250	93	5/ 12	6/ 10	34	66	58.0	22.2
Nebraska No. 60	--	10053	76	5/ 12	6/ 10	34	76	59.0	19
Sutton	--	5147	84	4/ 18	5/ 27	29	66	23.8	24.7
Nebraska No. 28	--	--	--	--	--	29	65	60.0	22.7

Probable error of a difference 1.0 bu.; Probable error of a mean 0.7 bu., or 2.58 percent

1/ = Average of 9 checks

E = Escaped.

Table 1. - (Continued)

Lawton, Oklahoma

(Three 1/50th-acre plots; seeded Oct. 3, 1932; emerged Oct. 11, 1932)

Variety	C. I. No.	Dates		Height (In.)	Leaf rust	Test weight per bu.	Acre yield (Bu.)	Av. Acre Yield 1931-33	
		Headed	Ripe					(P.ct.)	(lbs.)
Ioturk	11388	5/10	6/7	31	65	62	25.2	25.9	14
Cheyenne	8885	5/8	6/6	29	65	62	23.8	27.6	7
Tenmarq	6936	5/6	6/5	31	65	61	23.6	28.3	4
Blackhull	6251	5/6	6/5	32	65	63	23.4	27.0	10
Eagle Chief	8868	5/8	6/6	30	65	61	23.1	28.1	5
Kanred	5146	5/7	6/5	30	65	61	23.0	28.4	2
Turkey 102 (Goodwell)		5/8	6/6	30	65	61	22.9	27.4	8
Kawvale	8180	5/7	6/2	32	55	60	22.9	29.3	1
Kharkof	1442	5/10	6/6	30	65	61	22.7	28.4	2
Superhard	8054	5/6	6/5	32	65	63	22.7	26.6	11
Turkey	1558	5/10	6/7	30	65	61	22.7	27.4	8
Nebraska No. 60	6250	5/12	6/7	30	65	61	22.6	25.5	18
Redhull	11534	5/8	6/7	31	65	61	22.4	26.5	12
Kanred x Hard Federation	10092	5/1	6/1	28	40-65	61	21.6		
Purkof	8381	5/9	6/6	32	25	59	21.6	26.2	13
Quivira	8886	5/1	6/1	31	55	62	21.2	28.1	5
Denton	8265	5/7	6/6	34	5-25	60	21.2	25.7	16
Mediterranean	5303	5/7	6/5	32	65	60	20.9	25.4	19
Fulcaster	6471	5/7	6/5	32	65	60	20.1	25.8	15
Early Blackhull	8856	4/24	5/29	36	10-25	62	19.8	23.8	20
Kanred x Hard Federation	11373	5/1	6/1	28	40-65	61	19.6		
Harvest Queen	6199	5/7	6/6	34	40-65	60	18.7	23.5	21
Sibley No. 81	10084	5/7	6/6	31	65	61	18.2	25.7	16
Fultz	3416	5/7	6/3	33	65	58	17.1	21.6	23
Currell	3326	5/7	6/3	32	65	61	16.9	22.0	22
Nebraska No. 28	5147	4/21	5/26	30	25-65	59	15.2	18.9	24

Probable error of a difference 1.0 bu.; probable error of a mean 0.7 bu. or 3.33 percent.

Table 1. - (Continued)

Stillwater, Okla.

(Four 1/131-acre plots; seeded Oct. 5, 1932; emerged Oct. 10, 1933)

Variety	C. I. No.	Date.		Height (In.)	Test weight per bu.	Acre yield (Bu.)	Average acre yield 1931-33	
		Headed	Ripe				Bu.	Rank
Early Blackhull	8856	4/17	5/30	34	61.3	32.9	27.0	15
Blackhull	6251	5/1	6/4	36	60.9	31.9	30.4	5
Sibley No. 81	10084	5/3	6/4	34	59.6	30.6	29.6	8
Penquite	5948	5/1	6/3	35	59.5	30.1	31.5	1
Cheyenne	8885	5/3	6/4	33	58.2	29.7	30.5	3
Termarq	6936	4/29	6/4	33	55.8	28.6	28.2	10
Turkey	1558	5/3	6/5	33	58.5	27.5	1/ 31.2	2
Quivira	8886	4/26	6/1	35	58.3	27.4	25.4	17
Eagle Chief	8868	5/2	6/4	33	56.8	27.2	30.0	6
Redhull	11534	5/2	6/4	35	58.4	26.8	29.6	8
Kharkof	1442	5/3	6/4	33	56.7	26.6	29.7	7
Denton	8265	5/3	6/4	36	58.6	26.5	28.0	11
Kawvale	8180	5/1	6/3	31	57.7	26.4	24.5	19
Kanred	5146	5/2	6/4	33	56.6	26.3	26.4	16
Nebraska No. 28	5147	4/16	5/27	29	59.5	25.3	18.4	20
Turkey sel. (Okla.)	10083	5/4	6/2	33	57.8	24.2		
Sibley No. 62	11523	5/4	6/5	33	57.2	24.2	30.5	3
Purkof	8381	5/4	6/4	35	56.0	23.5	27.2	14
Nittany	5962	5/3	6/4	38	54.7	23.3		
Ioturk	11388	5/6	6/5	34	58.5	23.0	27.8	12
Nebraska No. 60	6250	5/4	6/5	32	58.2	22.9	27.6	13
Harvest Queen	6199	5/2	6/5	35	56.8	21.8	24.7	18

Probable error of a difference 2.8 bu.; probable error of a mean 2.0 bu. or 7.33 percent
 1/ Average of 51 check plots.

Carrier, Okla.

(Six 1/113-acre plots; seeded Oct. 5, 1932; emerged Oct. 10, 1932)

Variety	C. I. No.	Test weight per bu.	Acre yield (Bu.)	Av. acre yield 1931-33	
				Bu.	Rank
Blackhull	6251	61.0	22.7	26.9	5
Harvest Queen	6199	56.0	22.0	26.7	6
Nebraska No. 28	5147	59.2	21.7	20.1	14
Kawvale	8180	56.1	21.2	25.5	11
Cheyenne	8885	57.7	21.0	28.4	1
Termarq	6936	54.2	20.7	27.8	2
Denton	8265	56.5	20.4	25.0	12
Sibley No. 81	10084	58.8	20.4	27.1	4
Eagle Chief	8868	56.3	19.8	26.1	8
Quivira	8886	55.5	19.6	22.5	13
Turkey sel. (Okla.)	10083	56.0	19.5		
Nebraska No. 60	6250	57.0	18.9	26.4	7
Sibley No. 62	11523	55.3	18.5		
Kharkof	1442	55.9	18.4	27.3	3
Turkey	1558	56.4	17.9	25.8	9
Kanred	5146	55.3	16.9	25.8	9

Probable error of a difference 1.4 bu.; probable error of a mean 1.0 bu. or 4.96 percent

1/ Average of 60 check plots

Woodward, Okla.

(Four 1/47-acre plots; seeded Oct. 13, 1932; emerged Oct. 21, 1932)

Variety	C. I. No.	Dates		Height (In.)	Test weight per bu.	Acre yield (Bu.)	Average acre yield 1931-33	
		Head- ed	Ripe				Bu.	Rank
Early Blackhull	8856	4-21	6-3	25	59.5	22.1	29.4	19
Cheyenne	8885	5-5	6-7	27	58.5	21.7	36.1	1
Oro	8220	5-5	6-8	27	58.0	19.2	32.9	14
Kharkof (Hays No. 2)	6686	5-7	6-8	27	56.5	19.1	36.1	1
Superhard	8054	5-1	6-7	28	57.0	18.9	34.5	6
Kharkof	1442	5-7	6-8	26	56.0	18.5	35.6	3
Local Turkey	--	5-7	6-8	25	56.5	18.3	35.0	4
Nebraska No. 60	6250	5-9	6-9	25	56.5	18.1	33.3	10
Nebraska No. 28	5147	4-20	6-2	20	57.0	18.1	24.9	23
Blackhull	6251	5-3	6-7	29	56.0	18.0	33.7	8
Kanred x Marquis	10090	5-4	6-7	29	55.0	17.9	33.0	13
Fulcaster	6471	5-5	6-8	29	53.5	17.0	31.4	18
Turkey 102 (Goodwell)	--	5-5	6-7	27	54.0	17.0	33.5	9
Termarq	6936	5-2	6-6	28	50.0	16.8	35.0	4
Kawvale	8180	5-4	6-5	28	50.5	16.7	32.4	16
Kanred	5146	5-5	6-7	27	53.5	16.6	33.2	11
Quivira	8886	4-28	6-6	27	53.5	16.2	32.8	15
Cooperatoroka	8861	5-7	6-8	27	57.0	16.0	28.7	20
Redhull	11534	5-5	6-8	28	55.0	15.9	33.8	7
Eagle Chief	8868	5-6	6-7	27	54.0	15.6	33.2	11
Sibley No. 81	10084	5-5	6-7	27	54.5	15.6	31.9	17
Denton	8265	5-7	6-9	30	55.5	15.4	27.6	21
Harvest Queen	6199	5-6	6-7	32	54.0	15.2	26.1	22

Probable error of a difference 0.6 bu.; probable error of a mean 0.4 bu. or 2.32 percent

Table 1. - (Continued)

Manhattan, Kans.

(Three 1/40th-acre plots; seeded Sept. 30, 1932; emerged Oct. 8, 1932.)

Variety	C. I. No.	Winter survival 1/	Dates			Stand per acre No. with 000 omitted	Breaking strength of straw lbs. per 10 straws	Test weight per bu.	Acre yield	Average acre yield 1931 7 33	Bu. Rank	
			Read-	Ripe	in fall					(Lbs.) (Bu.)		
Early Blackhull	8856	85	5-22	6-14	38	1029	7.83 ± 0.04	61.1	37.6	46.1	7	
Ora	8220	85	5-21	6-19	41	1023	6.34 ± 0.16	56.4	36.3	43.4	11	
Turkey	18528	70	5-21	6-19	40	1004	6.50 ± 0.14	56.4	36.1	43.2	14	
Cooperator	8861	80	5-21	6-18	41	963	6.52 ± 0.36	57.2	36.1	47.2	5	
Blackhull	6251	85	5-19	6-18	38	966	7.41 ± 0.38	58.9	35.5	44.1	9	
Cheyenne	8886	80	5-21	6-20	38	1000	7.48 ± 0.02	57.2	35.1	46.8	3	
Quivira	8885	87	5-17	6-15	38	1036	6.94 ± --	57.4	34.3	44.7	8	
Kharkof	1442	87	5-22	6-19	39	1042	6.84 ± 0.14	55.4	32.9	41.3	17	
Kanred x Hard Federation	10092	83	5-16	6-16	36	780	7.18 ± 0.14	57.6	32.8	42.2	--	
Kanred	5146	85	5-21	6-18	39	1051	6.22 ± 0.12	53.8	32.5	41.0	19	
Nebraska No. 60	6250	85	5-23	6-20	40	1046	6.22 ± 0.14	54.2	31.5	43.1	16	
Kharkof (Hays No. 2)	6686	88	5-22	6-20	39	999	7.96 ± 0.22	53.9	31.4	41.3	17	
Tennarq sel.	10089	85	5-19	6-17	37	978	7.92 ± 0.27	54.4	31.4	47.1	6	
Kanred x Marquis	11589	83	5-18	6-15	37	968	8.72 ± 0.09	56.5	31.3	--	--	
Kanred x Hard Federation	11373	80	5-16	6-16	36	843	2157	7.98 ± 0.08	57.3	31.1	43.4	11
Do.	10091	67	5-15	6-15	35	970	1919	6.78 ± 0.07	57.1	29.5	--	--
Tennarq	6936	85	5-20	6-17	38	961	1887	8.61 ± 0.11	54.7	28.8	43.2	14
Kanred x Marquis	10090	83	5-20	5-17	38	960	2113	8.06 ± 0.35	55.0	28.5	43.9	10
Minturki	6155	85	5-23	6-20	41	114	2336	7.41 ± 0.07	53.5	28.4	43.4	11
Soft Red Winter ³												
Kawvale	8180	80	5-19	6-18	44	977	2302	7.01 ± 0.02	57.6	46.0	49.5	1
Clark's No. 40	8858	85	5-20	6-20	49	792	2226	7.66 ± 0.09	60.5	45.8	49.1	2
Fulcaster	6471	80	5-20	6-20	45	908	2162	8.32 ± 0.10	59.4	44.5	47.6	4
Harvest Queen	6199	75	5-20	6-20	49	969	2024	7.90 ± 0.09	57.9	37.1	40.4	20

Probable error of a difference 1.7 bu.; probable error of a mean 1.2 bu. or 3.67 percent

¹/ Does not represent plant survival but more tissue survival.²/ Average of 12 check plots.³/ Not in comparable test and not used in calculations. Kanred grown in the area occupied by the soft wheats made an average yield of 44.8 bushels, tested 57.8 pounds per bushel, the plants were 48" tall and ripened June 20.

Table 1. - (Continued)

Hays, Kans.

(Four 1/50th-acre plots)

Variety	C. I.	Winter survival	Dates		Height	Test weight per bu.	Acre yield (Bu.)	Average A.yield 1931-33
	No.		Head-ed	Ripe				Bu. Rank
		(P.ct.)		(In.)	(Lbs.)	(Bu.)		
Early Blackhull	8856	100	5-9	6-11	33	57	21.5	27.7 1
Kanred x Hard Federation	11373	100	5-9	6-12	28	56	19.5	-- -
Do.	10091	100	5-9	6-12	27	55	18.6	-- -
P1066-1 x Burbank	10087	100	5-17	6-15	27	53	18.4	-- -
Quivira	8886	100	5-9	6-13	33	55	18.3	25.8 7
Tenmarq sel.	10089	100	5-14	6-15	32	51	18.2	-- -
Blackhull	6251	100	5-16	6-16	32	56	18.0	27.5 2
Tenmarq	6936	100	5-15	6-15	31	52	17.9	26.4 4
Cheyenne	8885	100	5-18	6-16	27	57	17.8	27.3 3
Nebraska No. 60	6250	100	5-21	6-18	29	54	17.3	26.2 5
Oro	8220	100	5-21	6-17	30	53	17.3	26.2 5
Kanred x Marquis	11374	90	5-12	6-15	31	56	16.5	-- -
Kanred	5146	100	5-20	6-16	30	53	16.4	24.5 10
Kharkof (Hays No. 2)	6686	100	5-22	6-17	30	55	15.5	25.8 7
Turkey	1558	100	5-21	6-16	30	55	15.4	24.7 9
Kawvale	8180	100	5-16	6-15	29	50	15.0	21.3 14
Cooperatorka	8861	95	5-20	6-16	31	55	14.5	23.0 11
Marquis x Kanred (H.C.312)	--	90	5-19	6-18	29	54	14.4	-- -
Kharkof	1442	100	5-21	6-17	30	53	13.1	22.9 12
Minturki	6155	100	5-22	6-18	31	52	12.4	21.9 13

Probable error of a difference 1.4 bu.; probable error of a mean 1.0 bu. or 5.73 percent.

Table 1. - (Continued)

Akron, Colo.

(Two 1/50th-acre plots; seeded Sept. 19, 1932; emerged Sept. 29, 1932)(Cornland only)

Variety	C. I. No.	Spring stand	Dates		Height (In.)	Acre yield (Bu.)	Average acre yield	
			Head- ed	Ripe			1931	33
			(P.ct.)	(In.)			Bu.	Rank
Blackhull	6251	33	6-9	7-24	28	11.3	13.0	1
Turkey sel.	10016	40	6-10	7-24	28	10.6	--	-
Early Blackhull	8856	30	6-5	7-21	28	10.3	12.0	2
Quivira	8886	35	6-8	7-24	26	10.0	10.6	7
Kanred sel.	10099	35	6-12	7-24	27	9.4	11.2	4
Kanred	5146	40	6-12	7-24	27	8.8	10.8	6
Turkey sel.	10100	33	6-11	7-24	26	8.6	10.9	5
Tenmarq	6936	35	6-9	7-24	28	8.6	11.4	3
Oro	8220	35	6-12	7-24	27	8.1	10.0	9
Kharkof	1583	38	6-15	7-24	25	6.5	9.0	16
Kharkof (Hays No. 2)	6686	38	6-15	7-24	25	6.5	9.6	11
Nebraska No. 60	6250	38	6-15	7-24	26	6.4	9.3	15
Nebraska No. 6	6249	33	6-13	7-24	26	6.3	9.6	11
Yogo	8033	30	6-11	7-24	25	6.3	10.3	8
Minhardi x Minturki	8034	40	6-17	7-25	26	6.1	8.0	19
Cheyenne	8805	30	6-12	7-24	25	6.0	9.9	10
Kharkof	1442	38	6-15	7-24	25	5.8	9.4	14
Pesterboden sel.	8266	28	6-13	7-24	26	5.6	9.6	11
Alton	1438	33	6-15	7-24	25	5.1	8.2	18
Minturki	6155	28	6-17	7-25	26	4.6	6.7	20
Newturk	6935	30	6-14	7-24	25	4.4	8.7	17

Probable error of a difference 1.5 bu.; probable error of a mean 1.1 bu. or 14.26 percent

Table 1. (Continued)

Lincoln, Nebr.

(Three 1/35 and two 1/22.2-acre plots; seeded Oct. 3 and 4, 1932; emerged Oct. 13, 1932)

Variety	C. I. No.	Winter survival	P.ct.)	(In.)	Dates Head- ed	Height (In.)	Test weight per bu.	Acre yield (Bu.)	Average acre yield		
									1932-33	1931-32	Bu.
									2	1	38.5
Cheyenne	3885	100			5-31	35	55.3	29.3 ¹ /33.3	36.1	1	-
Kawvalle	8180	100			6-24	38	50.4	28.0	28.1	2	38.5
Kanred	5146	100			6-29	37	54.0	27.6	29.3	5	-
Kharkof (Hays No. 2)	6686	100			6-30	36	54.0	27.5	29.3	3	34.3
Kharkof	1442	100			6-31	37	53.8	26.8	29.1	4	34.6
Nebraska No. 60	6250	100			6-25	36	53.2	26.6	25.9	6	34.6
Belogolina sel.	8884	100			6-27	37	54.1	26.6	28.2	8	32.0
Turkey sel. Nebr. No. 1	--	100			6-26	36	54.2	26.6	27.8	12	-
Turkey sel.	10015	100			6-24	35	53.7	26.4	27.2	16	-
Do.	10095	100			6-26	35	53.9	26.4	27.2	16	-
Oro	18220	100			6-26	35	53.0	26.2	27.9	11	33.6
Turkey sel.	10016	100			6-22	35	51.9	26.2	27.4	14	-
Do.	10098	100			6-28	35	52.6	25.7	28.6	7	-
Tenmarq	6936	99			5-28	36	51.2	25.4	29.2	5	35.9
Crimean	1435	100			6-31	37	53.4	25.3	24.4	21	-
Turkey sel. Nebr. No. 312	--	100			6-21	36	53.0	25.0	25.0	1	-
Turkey sel.	10097	100			6-25	36	53.2	25.4	29.4	2	-
Do.	11506	99			6-30	37	53.4	25.3	24.4	2	-
Turkey sel. Nebr. No. 1005	--	100			6-24	36	53.5	24.6	28.8	13	-
Turkey sel.	10094	100			6-25	36	52.2	24.5	24.5	1	-
Crimean sel. Nebr. No. 1035	--	100			6-26	36	52.7	24.4	26.9	17	-
Iowin	10017	100			6-30	36	52.3	23.9	23.1	2	-
Turkey sel. Nebr. No. 1011	--	100			6-31	36	52.5	23.5	27.4	14	-
Blackhull	6251	95			6-29	36	52.8	23.1	28.0	10	33.8
Minturki	6155	100			6-21	36	54.2	22.8	29.4	3	33.4
Turkey Nebraska No. 6	6249	100			6-26	36	51.0	22.3	22.4	22	-
Quivira	8886	98			6-23	36	53.5	22.3	26.6	18	32.9
Kruse	11524	94			6-27	35	55.0	22.2	26.2	19	-
Early Blackhull	8856	91			6-22	35	55.0	22.2	26.2	19	-

Probable error of a difference 1.2 bu.; probable error of a mean 0.9 bu. or 3.38 percent

1/ Average of 10 plots.

Table 1. - (Continued)

North Platte, Nebr.

(Two 1/40th-acre plots; seeded Sept. 14, 1932; emerged Sept. 18, 1932) (Fallow only)

Variety	C. I. No.	Winter survival (P.ct.)	Date headed (In.)	Height (Bu.)	Acre yield Bu.	Average acre yield 1931 and 1933	
						Rank	
Nebraska No. 60	6250	95	6-3	35	36.0	38.8	1
Cheyenne	8885	100	6-2	35	36.0	38.8	1
Kharkof	1442	100	6-1	36	35.7	36.9	4
Beloglina sel.	8884	95	6-2	36	35.0	37.2	3
Turkey sel.	10094	100	6-1	37	35.0	--	-
Tenmarq	6936	90	6-1	35	34.0	36.1	7
Blackhull	6251	85	5-31	34	34.0	35.4	9
Sherman	4430	100	6-3	36	33.0	36.8	5
Newturk	6935	95	6-2	36	33.0	36.6	6
Local Turkey	--	95	5-29	35	32.3	35.8	8
Kanred	5146	100	6-2	36	32.0	34.4	12
Oro	8220	90	6-3	37	31.7	35.0	10
Beloglina	1543	85	6-2	33	31.3	32.9	14
Kharkof (Hays No. 2)	6686	100	6-3	37	31.3	32.2	15
Fulhard	8257	80	5-31	35	31.3	33.2	13
Kanred x Minturki	10012	90	6-3	38	30.7	31.7	16
Turkey sel.	10016	85	5-30	34	30.3	33.5	11
Minturki	6155	100	6-4	37	29.3	31.7	16
Quivira	8886	80	5-27	35	27.3	31.7	16
Tenmarq sel.	10089	60	6-1	32	25.7	--	-

Probable error of a difference 1.4 bu.; probable error of a mean 1.0 bu. or 3.13 percent.

Alliance, Nebr.

(Three 1/43th-acre plots; seeded Sept. 1, 1932; emerged Sept. 8, 1932)

Variety	C. I. No.	Winter survival (P.ct.)	Dates		Height (In.)	Acre yield Bu.	Average acre yield 1931 and 1933	
			Head- ed	Ripe			Bu.	Rank
Tenmarq	6936	57	6-10	7-10	29	29.7	17.3	8
Quivira	8886	53	6-10	7-9	29	29.3	18.2	3
Blackhull	6251	53	6-11	7-11	28	26.8	17.8	5
Oro	8220	68	6-15	7-12	28	26.5	18.4	2
Cheyenne	8885	65	6-15	7-12	25	25.2	17.8	5
Turkey sel.	10016	60	6-12	7-11	26	24.5	18.5	1
Kharkof (Hays No. 2)	6686	70	6-14	7-12	27	24.5	18.0	4
Minturki	6155	78	6-14	7-12	28	23.3	16.6	11
Kanred	5146	67	6-15	7-12	27	23.1	16.5	12
Turkey sel.	10094	65	6-15	7-12	26	22.1	--	-
Do.	10015	70	6-15	7-12	26	21.9	17.4	7
Kharkof	1442	63	6-14	7-12	27	21.7	16.8	10
Nebraska No. 60	6250	63	6-15	7-13	27	21.4	17.1	9
Turkey sel.	10098	63	6-12	7-11	26	20.5	--	-

Probable error of a difference 1.5 bu.; probable error of a mean 1.1 bu. or 4.34 percent

Table 1. - (Continued)

Sheridan, Wyo.

(Three 1/55th-acre plots; seeded Sept. 17, 1932; emerged Oct. 3, 1932)

Variety	C. I. No.	Dates Headed Ripe		Stand	Height (In.)	Test weight per bu. (Lbs.)	Acre yield (Bu.)	Average acre yield 1931 - 1933		Rank
		(P.ct.)	(In.)					Bu.	Bu.	
Kharkof (Hays No. 2)	6686	6-28	7-31	70	26	60	23.1	28.0	1	5
Kanred	5146	6-29	7-31	70	28	60	27.8	25.9	5	
Yogo	8033	6-29	7-31	73	27	60	26.9	26.6	3	
Nebraska No. 60	6250	6-29	7-31	70	28	60	25.7	26.2	4	
Minard x Minhardi	8889	6-28	7-31	73	30	60	25.1	25.3	6	
Montana No. 36	5249	6-28	7-31	72	30	60	25.0	27.7	2	
Minhardi x Minturki	8034	7-1	8-1	75	32	60	24.1	24.4	10	
Karmont	6700	6-29	7-31	68	27	60	23.5	25.1	7	
Kharkof	1442	6-29	7-31	69	28	60	22.41/	24.7	8	
Minhardi x Minturki	8215	6-30	8-1	68	30	60	21.4	23.3	12	
Newturk	6935	6-28	7-31	57	28	60	20.8	24.3	11	
Minturki	6155	6-29	7-31	75	29	60	20.5	21.5	13	
Turkey	1571	6-28	7-31	60	27	60	19.6	24.6	9	

Probable error of a difference 1.4 bu.; probable error of a mean 1.0 bu. or 4.24 percent ^{1/} Average of 12 check plots.Waseca, Minn.
(Three 1/40th-acre plots; seeded Sept. 7, 1932)

Variety	C. I. No.	Dates Head- ripe		Height (In.)	Lodged per cent	Degree Leaf rust	Plum- fulness	Texture per bu.	Test weight per acre yield	Acre yield 1931-33 (Bu.)	Rank
		(P.ct.)	(In.)								
Yogo	8033	95	6-11	7-12	38	20	80	35	80	58.2	1
Kanred	5146	83	6-9	7-9	35	17	90	85	75	57.5	7
Minturki	6155	98	6-10	7-9	39	0	70	90	80	59.0	4
Kharkof	1442	86	6-8	7-8	34	0	65	85	80	58.4	2
Newturk	6935	87	6-10	7-11	34	32	80	80	80	57.6	6
Minard x Minhardi	8888	99	6-9	7-10	36	0	60	80	80	58.2	5
Nebraska No. 60	6250	82	6-9	7-10	37	0	60	85	75	58.3	3
Karmont	6700	88	6-11	7-12	34	25	90	85	80	58.0	8
Minhardi x Marquis Minn. II-22-15	--	91	6-9	7-11	38	0	60	90	80	59.1	-
Minturki	8034	92	6-11	7-10	41	0	-	68	80	57.4	9

Probable error of a difference 1.6 bu.; probable error of a mean 1.1 bu. or 3.08 percent

Table 1. - (Continued)

Dickinson, N. Dak.

^{1/}
(One 1/80th-acre plot; seeded Sept. 21, 1932; emerged Oct. 16, 1932)

Variety	C. I.	Dates		Stand	Height	Test weight per bu.	Acre yield	Average acre yield	
		Headed	Ripe					Bu.	Rank
		(P.ct.)	(In.)	(Lbs.)	(Bu.)				
Beloglina	1543	6-20	7-24	19	24	61.0	9.2	15.1	3
Yogo	8033	6-21	7-25	21	25	60.5	8.8	15.7	1
Minturki	6155	6-20	7-24	38	25	60.5	7.9	14.1	6
Turkey	1571	6-20	7-24	31	24	62.0	7.5	15.7	1
Kanred	5146	6-20	7-23	19	24	61.0	7.2	14.8	4
Kanred x Buffum	8030	6-21	7-25	22	25	61.0	6.7	12.3	10
Nebraska No. 60	6250	6-20	7-24	23	24	60.5	6.4	14.7	5
Karmont	6700	6-21	7-25	35	23	60.0	5.6	13.4	8
Kharkof	1442	6-20	7-24	31	23	61.0	5.5	12.8	9
Minhardi x Minturki	8034	6-21	7-25	10	26	59.5	5.2	13.5	7

^{1/} The test was seeded in duplicate 1/40th-acre plots but due to severe winterkilling only a portion of one plot (1/80th-acre) of each variety was harvested.

Huntley, Mont.

(Three 1/50th-acre plots; seeded Sept. 17, 1932; emerged Oct. 10, 1932)

Variety	C. I. No.	Stand	Dates		Height	Test weight per bu.	Acre yield	Average acre yield	
			Headed	Ripe				Bu.	Rank
			(P.ct.)	(In.)	(Lbs.)	(Bu.)			
Montana No. 36	5549	87	6-16	7-10	28	60	16.4	23.9	1
Turkey	1558	87	6-16	7-8	28	59	14.7	19.7	6
Kharkof	1442	77	6-16	7-8	29	59	14.7	21.3	2
Alton	1438	80	6-16	7-10	27	58	14.4	20.7	5
Newturk	6935	77	6-16	7-8	27	59	14.2	21.0	4
Ridit	6703	70	6-13	7-10	31	58	14.1	21.1	3
Kanred	5146	80	6-16	7-10	27	58	13.3	19.6	7
Karmont	6700	67	6-16	7-10	27	58	10.8	17.4	8

Probable error of a difference 1.3 bu.; probable error of a mean 0.9 bu. or 6.47 percent

Table 1. - (Continued)

Bozeman, Mont.

(Three 1/120th-acre plots; seeded Sept. 7, 1932; emerged Sept. 16, 1932)

Variety	C. I. No.	Dates			Height (In.)	Lodging (P.ct.)	Test weight per bu. (Lbs.)	Protein (P.ct.)	Acre yield (Bu.)	Average acre yield 1931 and 1933 (Bu.)	Rank
		Headed	Ripe	bu.							
Karmont	6700	6-26	7-24	35	2	62.2	14.42	53.3	47.8	7	1
Yogo	8033	6-29	7-24	34	2	63.0	13.45	53.3	52.5	4	4
Minhardi x Minturki	8034	6-30	7-26	37	3	63.3	13.77	53.3	51.0	6	6
Kharkof	1442	6-28	7-25	36	3	63.5	15.37	53.0	50.0	3	3
Kanred	5146	6-29	7-25	34	2	63.0	15.33	51.7	52.0	2	2
Nebraska No. 60	6250	6-22	7-26	32	1	62.8	14.92	51.0	52.3	5	5
Minard x Minhardi	6253	6-23	7-26	36	1	62.9	14.03	51.9	50.9	4	4
Turkey x Minessa	8887	6-26	7-26	35	2	62.9	13.23	49.7	--	10	10
Montana No. 36	5549	6-27	7-25	34	7	63.5	15.65	49.3	45.6	12	12
Newturk	6935	6-26	7-24	36	2	63.1	13.88	48.3	44.7	8	8
Turkey x Florence Mont. No. 52	6935	6-23	7-26	36	0	62.7	12.39	47.7	46.3	13	13
Eureka x Minhardi	6036	6-22	7-24	33	3	63.6	12.69	47.3	--	11	11
Quiriva	2886	6-18	7-24	36	4	62.9	13.19	44.9	--	9	9
Minhardi x Minturki	8215	6-29	7-25	37	0	62.1	14.83	42.7	45.0	10	10
Minturki	6155	6-29	7-25	38	0	61.8	14.42	42.0	45.7	7	7
Turkey x Minturki N. N. 487	--	6-26	7-25	37	1	62.9	13.98	41.7	42.9	13	13

Probable error of a difference 4.2 bu.; probable error of a mean 3.0 bu. or 6.10 percent.

Table 1. - (Continued)

Moccasin, Mont.

(Four 1/50th-acre plots; seeded Sept. 6, 1932; emerged Sept. 15, 1933)

Variety	C. I. No.	Winter survival (P.ct.)	Test weight per bu. (Lbs.)	Acre yield (Bu.)	Average acre yield 1931 - 1933	
					Bu.	Rank
Minhardi x Minturki	8215	45	59.0	9.4	16.5	2
Minard x Minhardi	8888	28	59.0	9.3	--	-
Minhardi x Minturki	8034	32	57.5	8.7	14.8	8
Kanred x Minhardi	8040	28	56.5	8.3	15.4	5
Do.	8042	32	57.5	8.3	16.1	4
Turkey x Minessa	8887	23	56.0	8.2	16.5	2
Eureka x Minhardi	8036	27	58.5	8.1	17.6	1
Minard x Minhardi	8889	30	59.0	8.1	14.5	9
Minard x Minhardi	8218	35	58.0	7.7	--	-
Yogo	8033	28	58.0	7.7	15.3	6
Nebraska No. 60	6250	27	58.0	7.2	14.1	10
Kharkof	1442	13	60.0	6.5	13.7	11
Minturki	6155	17	59.0	6.1	13.4	12
Kanred x Minessa	8045	17	58.0	5.2	15.3	6
Turkey x Minessa	11505	13	55.5	4.8	--	-
Newturk	6935	10	58.5	4.3	12.0	15
Oro	8220	10	59.0	4.3	11.6	17
Turkey	1558	7	59.5	4.3	12.0	15
Kanred	5146	5	61.0	4.2	12.1	14
Karmont	6700	3	59.5	3.3	12.5	13

Probable error of a difference 1.0 bu.; probable error of a mean 0.7 bu. or 10.05 percent

Havre, Mont.(Three 1/50th-acre plots^{1/}; seeded Sept. 23, 1932; emerged Oct. 2, 1932.)

Variety	C. I. No.	Winter survival (P.ct.)	Dates		Height (In.)	Test weight per bu. (Lbs.)	Acre yield (Bu.)	Average acre yield 1931-1933	
			Head- ed	Ripe				Bu.	Rank
Minard x Minhardi	8888	62	6-18	7-18	20	61.4	6.6	--	-
Turkey x Minessa	8887	54	6-21	7-18	21	60.2	6.4	--	-
Kanred x Minhardi	8042	54	6-19	7-18	20	60.4	6.3	--	-
Montana No. 36	5549	27	6-18	7-18	20	60.8	6.0	5.4	7
Yogo	8033	64	6-20	7-18	20	61.4	5.3	7.8	1
Minard x Minhardi	8889	52	6-18	7-18	21	61.4	5.2	5.7	5
Minturki	6155	51	6-19	7-18	20	60.8	5.2	7.5	2
Turkey x Minessa	8028	56	6-20	7-18	20	60.2	5.1	7.0	3
Kanred	5146	34	6-17	7-18	20	60.8	5.1	4.6	11
Nebraska No. 60	6250	39	6-17	7-18	19	60.2	4.5	4.7	10
Minhardi x Minturki	8034	43	6-21	7-18	20	61.4	4.5	5.7	5
Minhardi x Minturki	8215	66	6-20	7-18	20	61.4	4.4	6.5	4
Kharkof	1442	12	6-18	7-18	18	61.4	3.8	3.9	12
Newturk	6935	13	6-19	7-18	20	60.8	3.7	5.0	8
Karmont	6700	10	6-20	7-18	18	60.2	3.5	4.9	9

Probable error of a difference 0.8 bu.; probable error of a mean 0.5 bu. or 10.73 percent

^{1/} Owing to excessive growth of Russian Thistles, it was impossible to harvest these plots with a binder. Yield data were obtained from 2 furrow drill rows 22 feet in length taken from each plot along the western border of the project.

PROBABLE ERRORS

For each station the probable error of a difference in bushels and the generalized probable error of a mean in bushels and percent were determined by "Student's" generalized formula, i. e.

$$\text{Probable error of a difference} = \pm 0.6745 \sqrt{\frac{2M(\sigma_T^2 - \sigma_V^2 - \sigma_R^2)}{(M-1)(N-1)}}$$

where T = yields of individual plots

V = mean yields of varieties

R = mean yields of replicates

M = number of varieties

N = number of plots of each variety

A generalized probable error of a mean in bushels may be calculated by dividing the probable error of a difference by $\sqrt{2}$.

The probable errors in bushels can be expressed in percent by dividing by the mean yield of all varieties and multiplying by 100. The summary of these probable errors is shown in table 2.

The probable error of an average of averages was determined by the formula

$$P. E. = \pm \frac{1}{\sqrt{N}} \sqrt{a^2 + b^2 + c^2} \quad n^2$$

where $a, b, c, \dots n$ = the separate probable errors and N = the number of separate averages.

Table 2. - Average yield, probable error of a difference, and probable error of a mean for the plot test at each cooperating station, 1933

Station	No. of plots	Average yield of varieties (Bu. per acre)	Probable error of a difference	Probable error of a mean	
				Bushels	Percent
(Bu.)					
Texas:					
Denton	4	28.0	1.0	0.7	2.58
Oklahoma:					
Lawton	3	21.3	1.0	0.7	3.33
Stillwater	4	26.7	2.8	2.0	7.33
Carrier	6	20.0	1.4	1.0	4.96
Woodward	4	17.6	0.6	0.4	2.32
Kansas:					
Manhattan	3	32.7	1.7	1.2	3.67
Hays	4	16.8	1.4	1.0	5.73
Colorado:					
Akron	2	7.4	1.5	1.1	14.30
Nebraska:					
Lincoln	5	25.3	1.2	0.9	3.38
North Platte	2	32.3	1.4	1.0	3.13
Alliance	3	24.3	1.5	1.1	4.34
Wyoming:					
Sheridan	3	23.9	1.4	1.0	4.24
Minnesota:					
Waseca	3	37.0	1.6	1.1	3.08
North Dakota:					
Dickinson	1	--	--	--	--
Montana:					
Huntley	3	14.1	1.3	0.9	6.47
Bozeman	3	49.7	4.2	3.0	6.10
Moccasin	3	6.7	1.0	0.7	10.05
Havre	3	5.0	0.8	0.5	10.73

SUMMARY OF YIELDS

The yields of the uniform varieties, as well as of the other varieties grown in the experiments, have been summarized for the different districts, States, and for the entire region.

Districts

Summaries of the yield data for the uniform varieties grown in 1933 and the average yields for 1931-33 are presented in tables 3 to 8.

Table 3. - Summary of average yields and percentage of Kharkof of 11 uniform winter-wheat varieties grown in plot tests at 5 stations in the southern district, 1933

Variety	C. I. No.	Average yield in bushels per acre at -					Average	Percentage of Kharkof
		Denton	Lawton	Stillwater	Carrier	Woodward		
Blackhull	6251	27.8	23.4	31.9	22.7	18.0	24.8	110.2
Tenmarq	6936	31.3	23.6	28.6	20.7	16.8	24.2	107.2
Kawvale	8180	30.3	22.9	26.4	21.2	16.7	23.5	104.4
Quivira	8886	32.1	21.2	27.4	19.6	16.2	23.3	103.6
Denton	8265	32.4	21.2	26.5	20.4	15.4	23.2	103.1
Kanred	5146	31.0	23.0	26.3	16.9	16.6	22.8	101.3
Kharkof	1442	26.1	22.7	26.6	18.4	18.5	22.5	100.0
Fulcaster	6471	28.9	20.1	--	--	17.0	22.0	98.2
Nebraska No. 60	6250	23.8	22.6	22.9	18.9	18.1	21.3	94.7
Harvest Queen	6199	25.2	18.7	21.8	22.0	15.2	20.6	91.6
Nebraska No. 28	5147	19.7	15.2	25.3	21.7	18.1	20.0	88.9
Probable error of a mean (bushels)		0.7	0.7	2.0	1.0	0.4	0.5	--
Do. (percent)		2.58	3.33	7.33	4.96	2.32	10.07	--

In the southern district in 1932 (table 3) the highest average yields were produced by Blackhull and Tenmarq, whereas Nebraska No. 60, Harvest Queen, and Nebraska No. 28 gave the lowest yields. In table 3 it was necessary to compute a percentage of Kharkof, since the Fulcaster plots were discarded at Stillwater and Carrier. Although again ranking last, it is of interest to note that Nebraska No. 28 made a better showing than in previous years, as would be expected since season was so dry and hot and early varieties had an advantage. It should also be pointed out that only at Carrier does Harvest Queen make a good showing. For the three year period (table 4) the weighted averages of the varieties are in much the same relation as last year, except that Nebraska No. 60 dropped from fourth to seventh place. Tenmarq continues to rank first among the uniform varieties and Nebraska No. 28 last.

Table 4. - Summary of average yields of 11 uniform winter-wheat varieties in the plot tests at 7 stations in the southern district, 1931-33

Variety	C. I. No.	Average yield in bushels per acre at -							Weighted average (Bu.)
		Denton	Ama- rillo 1/	Lawton	Still- water	Carrier	Wood- ward	Good- well 2/	
Tenmarq	6936	35.2	16.4	28.3	28.2	27.8	35.0	27.8	29.8
Kharkof	1442	27.4	13.5	28.4	29.7	27.3	35.6	29.2	28.7
Kanred	5146	31.7	13.5	28.4	26.4	25.8	33.2	30.5	28.4
Blackhull	6251	28.1	14.6	27.0	30.4	26.9	33.7	29.2	28.4
Quivira	8886	36.2	15.4	28.1	25.4	22.5	32.8	23.5	27.6
Kawvale	8180	33.5	14.9	29.3	24.5	25.5	32.4	22.8	27.6
Nebraska No. 60	6250	25.6	11.1	25.5	27.6	26.4	33.3	33.5	27.4
Denton	8265	33.8	12.8	25.7	28.0	25.0	27.6	25.2	26.9
Fulcaster	6471	30.0	12.7	25.8	27.32/	21.52/	31.4	22.2	26.0
Harvest Queen	6199	24.2	10.9	23.5	24.7	26.7	26.1	23.7	24.1
Nebraska No. 28	5147	14.1	10.3	18.9	18.4	20.1	24.9	19.9	18.9

1/ 1931 yields only. 2/ 1931-32 yields only.

In the central district for 1933 (table 5) yields were obtained at 6 stations. Cheyenne and Blackhull gave the highest and very nearly identical average yields. Minturki gave the lowest average yield for the group of stations. For the 3-year period (table 6) Cheyenne has the highest average yield, followed by Blackhull and Tenmarq. Kanred and Minturki rank last. The order of the varieties for the 3-year period is almost identical with the order based on the 2-year average, except that Oro moved from sixth to fourth place.

Table 5. - Summary of average yields of 10 uniform winter-wheat varieties grown in plot tests at 6 stations in the central district, 1933

Variety	C. I. No.	Average yield in bushels per acre at -						Average
		Manhat- tan	Hays	Akron	Lincoln	North Platte	Alliance	
Cheyenne	8885	35.1	17.8	6.0	29.3	36.0	25.2	24.9
Blackhull	6251	35.5	18.0	11.3	23.1	34.0	26.8	24.8
Oro	8220	36.3	17.3	8.1	26.1	13.7	26.5	24.3
Tenmarq	6936	28.8	17.9	8.6	25.4	34.0	29.7	24.1
Quivira	8886	34.3	18.3	10.0	22.3	27.3	29.3	23.6
Kanred	5146	32.5	16.4	8.8	27.6	32.0	23.1	23.4
Nebraska No. 60	6250	31.5	17.3	6.4	26.8	36.0	21.4	23.2
Kharkof (Hays No. 2)	6686	31.4	15.5	6.5	27.5	31.3	24.5	22.8
Kharkof	1442	32.9	13.1	5.8	26.9	35.7	21.7	22.7
Minturki	6155	28.4	12.4	4.6	22.9	29.3	23.3	20.2

Probable error of a mean Do.	{bushels} {percent}	1.2	1.0	1.1	0.9	1.0	1.1	0.4
		3.67	5.73	14.30	3.38	3.13	3.34	2.84

Table 6. - Summary of average yields of 10 uniform winter-wheat varieties grown in plot tests at 8 stations in the central district, 1931-33

Variety	C. I. No.	Average yield in bushels per acre at -								Weighted average
		Manhat- tan	Hays	Colby	Akron	Lincoln	North Platte	Alli- ance	Valon- tine	
		1/					2/	2/	3/	
Cheyenne	8885	48.8	27.3	42.6	9.9	38.5	38.8	17.8	9.8	30.6
Blackhull	6251	44.1	27.5	41.3	13.0	33.8	35.4	17.8	9.1	29.1
Tenmarq	6936	43.2	26.4	38.1	11.4	35.9	36.1	17.3	8.4	28.5
Oro	8220	43.4	26.2	38.9	10.0	33.6	35.0	18.4	7.1	28.0
Nebraska No. 60	6250	43.1	26.2	38.0	9.3	32.0	38.8	17.1	8.8	27.8
Kharkof (Hays No. 2)	6686	41.3	25.8	38.6	9.6	34.6	32.2	18.0	9.5	27.4
Kharkof	1442	41.3	22.9	38.8	9.4	34.6	36.9	16.8	9.6	27.3
Quivira	8886	44.7	25.8	37.4	10.6	32.9	31.7	18.2	7.6	27.3
Kanred	5146	41.0	24.5	36.9	10.8	34.3	34.4	16.5	7.9	27.1
Minturki	6155	43.4	21.9	32.0	6.7	33.4	31.7	16.6	8.2	25.5

1/ 1931-32 yields only. 2/ 1931 and 1933 yields only. 3/ 1931 yields only.

In the northern district (table 7) the 10 uniform varieties were all harvested at only 4 stations. Additional data although not complete are available from three additional stations. For this reason two averages are shown, one for 4 stations and another for all stations reporting yields. A percentage of Kharkof in comparable tests is also shown, and the varieties are ranked in order of this figure. Yogo and Minard x Minhardi (C. I. 8889) ranked first, while Minhardi x Minturki (C. I. 8215) ranked last. Based on the 4-station average Yogo ranks first and Minturki last. For the 3-year period (table 8) weighted averages are shown for 7 stations and for all stations. The percentages of Kharkof for all stations are also shown. The varieties are listed in order of the percentage of Kharkof for all stations. Yogo ranks first followed by Minard x Minhardi (C. I. 8889), while Minturki and Newturk gave the lowest percentages of Kharkof. These data again emphasize the rather narrow range of adaptation of Minturki.

Table 7. - Summary of average yields of 10 uniform wheat varieties grown in plot tests at 7 stations in the northern district, 1933

Variety	C. I. No.	Average yield in bushels per acre at -				Average of 4 stations 1/ 1	Average all stations	Percentage of Kharkof in same tests
		Waseca	Dickinson	Sheridan	Huntley			
Yogo	8033	40.4	8.8	26.9	--	53.3	5.3	110.2
Minard x Minhardi	8889	--	--	25.1	7.7	51.0	5.2	104.7
Kanred	5146	39.5	7.2	27.8	13.3	51.7	4.2	103.9
Nebraska No. 60	6250	36.5	6.4	25.7	--	51.0	5.1	101.9
Kharkof	1442	37.5	5.5	22.4	14.7	53.0	4.8	100.0
Minhardi x Minturki	8034	32.8	5.2	24.1	--	53.3	4.5	99.5
Karmont	6700	36.3	5.6	23.5	10.8	53.3	3.3	95.1
Newturf	6935	37.4	--	20.8	14.2	48.3	4.3	93.5
Minturki	6155	37.9	7.9	20.5	--	42.0	6.1	92.6
Minhardi x Minturki	8215	--	--	21.4	--	42.7	9.4	91.1

Probable error of a mean (Bu.)

(percent)

Do.

Includes Sheridan, Bozeman, Moccasin and Havre

1/

Do.

Table 8. - Summary of average yields of 10 uniform varieties grown in plot tests at 9 stations in the northern district, 1933

Variety	C. I. No.	Average yield in bushels per acre at -				Huntley 1/2	Mocca- sin	Havre	7 stations	All stations	Weighted average	Percentage of Kharkof all stations
		Waseca	Redfield in- sight	Dick- Archer	Sheridan Boze- man							
Yogo	8033	36.7	24.1	15.7	12.5	26.6	52.5	--	15.3	7.8	24.3	110.0
Minard x Minhardi	8889	37.8	22.1	--	12.5	25.3	50.9	--	14.5	5.7	22.5	106.6
Nebraska No. 60	6250	36.0	18.5	14.7	13.9	26.2	52.3	--	14.1	4.7	22.0	104.3
Minhardi x Minturki	8034	31.7	18.6	13.5	12.1	24.4	51.0	--	14.8	6.5	21.2	100.5
Do.	8215	32.5	19.1	--	12.1	23.3	45.0	--	16.5	6.5	21.1	100.0
Kharkof	1442	36.6	15.9	12.8	13.9	24.7	50.0	21.3	13.7	3.9	22.0	100.0
Kanred	5146	35.0	15.6	14.8	12.6	25.9	52.0	19.6	12.1	4.6	21.8	99.5
Karmont	6700	33.6	17.6	13.4	14.7	25.1	47.8	17.4	12.5	4.9	21.6	97.2
Minturki	6155	32.9	16.3	14.1	14.6	21.5	42.7	17.4	13.4	4.5	21.2	94.2
Newturf	6935	35.1	16.9	--	12.7	24.3	44.7	--	12.0	5.0	21.0	95.9

1/ 1931-32 yields only

2/ 1932-33 yields only

3/ 1931 and 1933 yields only

States

In several of the States there are two or more cooperating stations. At some of these stations only the uniform varieties are grown, while at others additional varieties are included. An attempt has been made to summarize the data for each State by showing the 1933 average yields for the reporting stations together with the 1931 to 1933 average for these varieties at the same stations. These data are shown in tables 9 to 14, where the varieties are listed in order of 1933 average yield. It is hoped that when more data are available the stations can be grouped by similar reactions rather than by State boundaries.

In Texas (table 9) Quivira and Tenmarq ranked first and second, whereas Harvest Queen and Nebraska No. 28 gave the lowest average yields.

Table 9. - Average yield in bushels per acre of winter-wheat varieties grown in plant tests at Amarillo in 1931 and at Denton 1931-33

Variety	C. I. No.	Average yield in bushels per acre (weighted)
Quivira	8885	31.0
Tenmarq	6936	30.5
Kawvale	8180	28.9
Denton	8265	28.6
Kanred	5146	27.2
Fulcaster	6471	25.7
Blackhull	6251	24.7
Kharkof	1442	23.9
Nebraska No. 60	6250	22.0
Harvest Queen	6199	20.9
Nebraska No. 28	5147	13.2

The data from 4 stations in Oklahoma are averaged in table 10. For 1933 Cheyenne and Blackhull gave the highest average yields, whereas Nebraska No. 28 and Harvest Queen were the lowest. For the 3-year average Cheyenne ranks first, Kharkof second, and Nebraska No. 28 last.

Table 10. - Average yield in bushels per acre of winter-wheat varieties grown in plot tests at Lawton, Stillwater, Carrier, and Woodward, Okla. in 1933 and average for 1931-33

Variety	C. I. No.	Average yield in bu. per acre	
		1933	1931-1933
Cheyenne	8885	24.1	30.7
Blackhull	6251	24.0	29.5
Tenmarq	6936	22.4	29.8
Kawvale	8180	21.8	27.9
Kharkof	1442	21.6	30.3
Eagle Chief	8868	21.4	29.4
Sibley No. 81	10084	21.2	28.6
Quivira	8886	21.1	27.2
Denton	8265	20.9	26.6
Kanred	5146	20.7	28.5
Nebraska No. 60	6250	20.6	28.2
Nebraska No. 28	5147	20.1	20.6
Harvest Queen	6199	19.4	25.3
Probable error of a mean (bu.)		0.6	
" " " " (percent)		2.43	

In 1933 yields were obtained from only two stations (Manhattan and Hays) in Kansas. These averages are shown in table 11. Kawvale, Early Blackhull, Blackhull, and Oro had the highest averages while Termarq, Kharkof, and Minturki gave the lowest yields. For the 3-year period, Cheyenne and Early Blackhull have the highest and Kharkof and Minturki the lowest average yields.

Table 11. - Average yield in bushels per acre of winter-wheat varieties grown in plot tests at Manhattan and Hays, Kans., in 1933 and the average for 1931-33

Variety	C.I.No.	Average yield in bushels per acre	
		1933	1931 - 1933
Kawvale	8180	30.5	35.4
Early Blackhull	8856	29.6	36.9
Blackhull	6251	26.8	35.8
Oro	8220	26.8	34.8
Cheyenne	8885	26.5	38.1
Quivira	8886	26.3	35.3
Turkey	1558	25.8	34.0
Kanred x Hard Federation	11373	25.3	--
Cooperatoroka	8861	25.3	35.1
Termarq sel.	10089	24.8	--
Kanred	5146	24.5	32.8
Nebraska No. 60	6250	24.4	34.7
Kanred x Hard Federation	10091	24.1	--
Kharkof (Hays No. 2)	6686	23.5	33.6
Tenmarq	6936	23.4	34.8
Kharkof	1442	23.0	32.1
Minturki	6155	20.4	32.7
Probable error of a mean (bu.)		0.8	
Probable error of a mean (percent)		3.40	

In Nebraska for 1933 three stations are averaged (table 12). Cheyenne and Termarq ranked first, while Quivira and Minturki ranked last. In this case there seems to be little relationship between average yield and either hardiness or earliness.

The 3-year average yields show the same general ranking as the 1933 figures.

Table 12. - Average yield in bushels per acre of winter-wheat varieties grown in plot tests at Lincoln, North Platte, and Alliance, Nebr., in 1933 and the average 1931-33

Variety	C.I.No.	Average yield in bushels per acre	
		1933	1931-33 (weighted) ^{1/}
Cheyenne	8885	30.2	30.8
Tenmarq	6936	29.7	29.0
Kharkof	1442	28.1	28.5
Oro	8220	28.1	28.3
Nebraska No. 60	6250	28.1	28.1
Blackhull	6251	28.0	28.2
Kharkof (Hays No.2)	6686	27.8	27.8
Kanred	5146	27.6	27.7
Turkey sel.	10094	27.3	--
Do.	10016	26.9	--
Quivira	8886	26.3	27.1
Minturki	6155	25.2	26.7

Probable error of a mean (bu.) 0.6
 Probable error of a mean (percent) 2.11

^{1/} Yields from North Platte are for 1931 and 1933 only.

In Wyoming (table 13) yields have been obtained for 2 years at Archer (1931-32) and 3 years at Sheridan. Very small differences in average yields are shown by the varieties, except that Minturki has the lowest average. Yogo, Karmont, and Nebraska No. 60 are the highest in average yield.

Table 13. - Average yield in bushels per acre of winter-wheat varieties grown in plot tests at Archer, 1931-32 and Sheridan, Wyo., 1931-33

Variety	C.I.No.	Average yield (weighted)	
		1931-33 (Bu.)	
Yogo	8033	21.0	
Karmont	6700	20.9	
Nebraska No. 60	6250	20.9	
Turkey	1571	20.7	
Kanred	5146	20.6	
Kharkof	1442	20.4	
Minhardi x Minturki	8034	20.2	
Minard x Minhardi	8889	20.2	
Newturk	6935	19.7	
Minhardi x Minturki	8215	18.8	
Minturki	6155	17.5	

In 1933 for three stations in Montana (table 14) Minhardi x Minturki (C. I. 8034) and Yogo ranked first, while Minhardi x Minturki (C. I. 8215), Newturk, and Minturki had the lowest average yields. For the 3-year average Yogo and Minhardi x Minturki (C. I. 8034) were first for average yield and Newturk last.

Table 14. - Average yield in bushels per acre of winter-wheat varieties grown in plot tests at Bozeman, Moccasin, and Havre, Mont., 1933 and the average for 1931-33.

Variety	C. I. No.	Average yield in bushels per acre	
		1933	1931-33 ^{1/} (weighted)
Minhardi x Minturki	8034	22.2	20.4
Yogo	8033	22.1	21.8
Minard x Minhardi	8889	21.4	20.3
Turkey x Minessa	8887	21.4	--
Kharkof	1442	21.1	19.1
Nebraska No. 60	6250	20.9	20.1
Kanred	5146	20.3	19.3
Karmont	6700	20.0	18.5
Minhardi x Minturki	8215	18.8	19.9
Newturk	6935	18.8	17.6
Minturki	6155	17.8	19.3
Probable error of a mean (bu.)		1.0	
Probable error of a mean (percent)		5.35	

1/ No 1932 yields from Bozeman used.

Region

In table 15 there is presented a summary of the yields of all varieties reported as being grown in the 3-year period 1931-33. Because various varieties were grown at different stations and for different periods the yields are expressed in percentages of Kharkof (C. I. 1442) grown in comparable tests. The data are given for each of the three districts as well as for the entire area. The varieties are listed in alphabetical order.

While it is unsafe to put too much reliance in these figures, which are based on the yield of a single variety at all stations, some interesting comparisons are possible. Of 129 varieties, 53 have a percentage yield for the entire region greater than Kharkof. Based on the results of 19 station years' Cheyenne gave a percentage of 112.1 for the central district and 107.4 for the entire area.

Early Blackhull has a better comparative record in the central than in the southern area. This probably can be explained by the fact that late freezes in the spring of 1931 and 1932 greatly injured the early varieties at the southern stations.

The performance of Kanred is of interest since it is so nearly identical with Kharkof. For this reason Kanred was dropped as a uniform variety for all stations in the fall of 1933 and replaced by Turkey sel. (C. I. 10016). Several Mediterranean selections show good records in the southern district. These have been grown chiefly at Denton and while they are outstanding the high percentage is partly due to the poor record of Kharkof. In a total of 36 comparative tests Tenmarq has yielded 104.3 percent of Kharkof.

Yogo has been grown in 23 comparable tests with Kharkof and has yielded 111.3 percent, being slightly better in the northern than in the central area. For detailed comparisons, however, the individual station records must be studied.

Table 15. - Yields of varieties and strains of winter-wheat expressed in percentage of Kharkof (C. I. 1442), grown in plot tests at one or more of the cooperating stations in the hard red winter-wheat region, 1931 - 1933

Variety	C. I. No.	Southern District		Central District		Northern District		Entire Region		
		No. sta- tion years	Per cent of Khar- kof	No. sta- tion years	Per cent of Khar- kof	No. sta- tion years	Per cent of Khar- kof	Avg. yield of variety	Avg. yield of Kharkof	Per cent of Khar- kof
Alton	1438	-	--	3	87.2	4	96.6	13.2	14.1	93.6
Beloglina	1543	-	--	2	89.2	5	102.8	17.3	18.2	95.1
Beloglina sel.	8884	-	--	4	99.1	-	--	32.7	33.0	99.1
Do.	10013	-	--	1	85.0	-	--	32.4	38.1	85.0
Blackhull	6251	18	99.0	19	106.6	-	--	28.8	28.0	102.9
Cheyenne	8885	14	102.0	19	112.1	-	--	30.6	28.5	107.4
Clark's No. 40	8858	-	--	3	118.9	-	--	49.1	41.3	118.9
Colorado Mutant 556	-	-	--	1	81.5	-	--	7.5	9.2	81.5
Cooperatorka	8861	3	80.6	8	104.7	1	98.1	34.6	35.3	98.0
Crimean	1435	-	--	2	83.8	-	--	24.4	29.1	83.8
Crimean sel.Neb.No.1035	-	-	--	3	91.3	-	--	14.7	16.1	91.3
Currell	3326	7	81.5	1	97.3	-	--	27.0	32.0	84.4
Denton	8265	18	93.4	-	--	-	--	26.8	28.7	93.4
Eagle Chief	8863	14	96.7	-	--	-	--	29.1	30.1	96.7
Early Blackhull	8856	14	79.8	14	103.9	-	--	27.1	29.7	91.2
Eureka x Minhardi	8036	-	--	-	--	5	106.8	22.0	20.6	106.8
Fulcaster	6471	16	88.1	4	111.1	-	--	28.8	30.8	93.5
Fulhard	8257	-	--	4	98.7	-	--	37.0	37.5	98.7
Fultz	3416	9	76.7	-	--	-	--	23.0	30.0	76.7
Galgalos x Turkey	11540	-	--	-	--	1	107.6	9.9	9.2	107.6
Harvest Queen	6199	18	84.0	4	98.3	-	--	26.2	30.1	87.0
Imported Red Russian	-	-	--	1	103.9	-	--	21.4	20.6	103.9
Iobred	6934	-	--	1	96.2	-	--	30.0	31.2	96.2
Loturk	11388	10	96.6	-	--	-	--	28.6	29.6	96.6
Iowin	10017	-	--	2	92.4	-	--	26.9	29.1	92.4
Kanmarq	6937	-	--	1	98.7	-	--	37.6	38.1	98.7
Kanred	5146	18	99.0	19	99.3	22	99.5	25.2	25.4	99.2
Kanred x Buffum	8030	-	--	-	--	4	113.1	9.5	8.4	113.1
Kanred x Hard Federation	10091	-	--	3	111.7	-	--	34.3	30.7	111.7
Do.	10092	2	100.4	2	101.8	-	--	33.7	33.3	101.2
Do.	11373	2	96.7	6	99.4	-	--	32.6	33.0	98.8
Do.	Kans.516	--	--	1	105.2	-	--	48.4	46.0	105.2
Kanred x Marquis	10090	3	92.7	3	106.3	-	--	38.4	38.4	100.0
Do.	11374	-	--	4	96.7	-	--	31.9	33.0	96.7
Do.	11589	-	--	1	95.1	-	--	31.3	32.9	95.1
Do.	Kans.2642	--	--	1	109.2	-	--	22.5	20.6	109.2
Kanred x Minessa	8045	-	--	-	--	3	111.7	15.3	13.7	111.7
Kanred x Minhardi	8031	-	--	-	--	1	69.4	2.5	3.6	69.4
Do.	8040	-	--	-	--	3	112.4	15.4	13.7	112.4

Table 15. - Yields of varieties and strains of winter-wheat expressed in percentage of Kharkof (C. I. 1442), grown in plot tests at one or more of the cooperating stations in the hard red winter-wheat region, 1931 - 1933 - (Continued)

Variety	C. I. No.	Southern District		Central District		Northern District		Entire Retion		
		No. sta- tion years	Per ct Khar- kof	No. sta- tion years	Per ct Khar- kof	No. sta- tion years	Per ct Khar- kof	Av. yield of variety	Av. yield of Kharkof	Per ct Khar- kof
Kanred x Minhardi	8042	-	--	-	--	4	121.4	13.6	11.2	121.4
Do.	10000	-	--	-	--	2	111.6	19.3	17.3	111.6
Kanred x Minturki	10012	-	--	2	85.9	-	--	31.7	36.9	85.9
Kanred sel.	10099	-	--	3	119.1	-	--	11.2	9.4	119.1
Karmont	6700	-	--	2	85.3	22	96.7	21.2	22.2	95.5
Kawvale	8180	18	96.2	8	113.4	-	--	30.0	29.5	101.7
Kharkof	1442	18	100.0	19	100.0	22	100.0	25.4	25.4	100.0
Do.	1583	-	--	3	95.7	-	--	9.0	9.4	95.7
Kharkof (Hays No. 2)	6686	3	101.4	19	100.4	4	113.5	27.4	26.9	101.9
Kharkof	6938	-	--	1	76.3	2	102.9	19.8	21.9	90.4
Kruse	11524	-	--	2	91.4	-	--	26.6	29.1	91.4
Malakof	5663	4	98.7	-	--	-	--	29.8	30.2	98.7
Marquis x Kanred	10008	-	--	2	92.8	-	--	22.0	23.7	92.8
Do.	10009	-	--	1	90.0	-	--	34.3	38.1	90.0
Do. Hays No. 312	--	-	--	2	95.9	-	--	23.1	24.1	95.9
Mediterranean	5303	9	86.3	-	--	-	--	25.9	30.0	86.3
Mediterranean sel.	10085	2	125.5	-	--	-	--	30.0	23.9	125.5
Do.	10086	3	108.8	-	--	-	--	29.8	27.4	108.8
Do.	11525	2	124.3	-	--	-	--	29.7	23.9	124.3
Do.	11526	2	128.0	-	--	-	--	30.6	23.9	128.0
Do.	11567	3	106.6	-	--	-	--	29.2	27.4	106.6
Do. Tex. No. 5933-32	--	2	122.2	-	--	-	--	29.2	23.9	122.2
Do. Tex. No. 5933-36	--	1	132.3	-	--	-	--	28.7	21.7	132.3
Do. Tex. No. 5933-38	--	2	125.9	-	--	-	--	30.1	23.9	125.9
Minard	6690	-	--	1	101.6	3	74.3	21.3	25.9	82.2
Minard x Minhardi	8218	-	--	-	--	2	96.6	19.8	20.5	96.6
Do.	8888	-	--	-	--	6	101.9	26.3	25.8	101.9
Do.	8889	-	--	-	--	17	106.6	22.5	21.1	106.6
Minhardi	5149	1	59.9	-	--	-	--	23.5	39.2	59.9
Minhardi x Marquis	Minn. II-22-15	--	--	-	--	1	92.5	34.7	37.5	92.5
Minhardi x Minturki	8034	-	--	3	85.1	20	100.5	19.5	19.5	100.0
Do.	8215	-	--	-	--	17	100.0	21.1	21.1	100.0
Minturki	6155	2	99.3	19	93.4	20	97.2	23.2	24.4	95.1
Minturki x Marquis	11501	-	--	-	--	1	109.4	39.5	36.1	109.4
Do.	11502	-	--	-	--	1	101.1	36.5	26.1	101.1
Montana No. 36	5549	-	--	1	100.0	11	104.3	23.0	22.2	103.6
Nebraska No. 6	6249	-	--	6	91.3	-	--	18.9	20.7	91.3
Nebraska No. 30	7358	-	--	1	103.9	-	--	39.6	38.1	103.9
Nebraska No. 60	6250	18	95.5	19	101.8	21	103.7	25.6	25.6	100.0
Nebraska No. 28	5147	18	65.5	3	92.5	-	--	20.6	29.4	70.1
Newturf	6935	-	--	5	97.5	20	95.9	20.8	21.6	96.3
Nittany	6962	2	94.6	-	--	-	--	22.7	24.0	94.6
Oro	8220	3	92.4	19	102.2	5	90.8	25.0	25.0	100.0
Penquite	5948	5	101.3	-	--	-	--	30.9	30.5	101.3
Pesterboden sel.	8266	-	--	3	102.1	2	102.2	11.4	11.2	101.8
P1066-1 x Burbank	10087	-	--	2	104.1	-	--	25.1	24.1	104.1
Purkof	8381	10	92.2	-	--	-	--	27.3	29.6	92.2
Quivira	8386	18	96.2	19	98.2	1	83.0	27.6	28.7	96.2
Redhull	11534	13	96.8	-	--	-	--	30.0	31.0	96.8
Ridit	6703	-	--	-	--	2	99.1	21.1	21.3	99.1
Sherman	4430	-	--	2	99.7	-	--	36.8	36.9	99.7
Sibley No. 62	11523	4	102.2	-	--	-	--	27.5	26.9	102.2
Sibley No. 81	10084	14	93.4	-	--	-	--	28.1	30.1	93.4
Smithsonian	10022	-	--	-	--	1	86.1	29.7	34.5	86.1
Superhard	8054	12	92.7	4	103.0	-	--	30.5	31.9	95.6
Sutton	10053	3	112.8	-	--	-	--	30.9	27.4	112.8

Table 15. - Yields of varieties and strains of winter-wheat expressed in percentage of Kharkof (C. I. 1442), grown in plot tests at one or more of the cooperating stations in the hard red winter-wheat region, 1931 - 1933 - (Continued)

Variety	C. I. No.	Southern District		Central District		Northern District		Entire Region		
		No. sta- tion years	Per ct Khar- kof	No. sta- tion years	Per ct Khar- kof	No. sta- tion years	Per ct Khar- kof	Av. yield of variety	Av. yield of Kharkof	Per ct of Khar- kof
Tenmarq	6936	18	103.8	18	104.9	-	--	28.9	27.7	104.3
Tenmarq (Colby)	--	-	--	2	96.6	-	--	37.5	38.8	96.6
Tenmarq sel.	10089	-	--	7	105.7	-	--	37.1	35.1	105.7
Do. Kans. 2637	--	-	--	1	119.9	-	--	37.4	31.2	119.9
Do. Kans. 2688	--	-	--	1	121.4	-	--	54.5	44.9	121.4
Do. Kans. 2669	--	-	--	1	114.3	-	--	51.3	44.9	114.3
Turkey	1558	9	98.6	8	103.8	5	90.4	27.7	27.7	100.0
Do.	1571	-	--	-	--	7	106.0	19.3	18.2	106.0
Do.	6152	-	--	-	--	2	101.2	17.5	17.3	101.2
Turkey 101	--	2	106.5	-	--	-	--	31.1	29.2	106.5
Turkey (Ellis Co.)	--	-	--	1	111.2	-	--	22.9	20.6	111.2
Turkey 102 (Goodwell)	--	12	95.2	-	--	-	--	29.9	31.4	95.2
Turkey (North Platte)	--	-	--	2	97.0	-	--	35.8	36.9	97.0
Turkey (Seward Co.)	Nebr. 1005	--	-	--	1	92.2	-	24.8	26.9	92.2
Turkey (Woodward)	--	3	98.3	-	--	-	--	35.0	35.6	98.3
Turkey x Florence Mont. No. 52	--	-	--	-	--	2	92.6	46.3	50.0	92.6
Turkey x Minessa	8028	-	--	-	--	4	244.8	7.1	2.9	244.8
Do.	8887	-	--	-	--	4	100.4	24.6	24.5	100.4
Do.	11505	-	--	-	--	2	74.6	15.3	20.5	74.6
Turkey x Minturki N.N. 487	--	-	--	-	--	2	85.8	42.9	50.0	85.8
Turkey sel.	10015	-	--	5	98.0	-	--	19.8	20.2	98.0
Do.	10016	-	--	9	100.5	-	--	21.6	21.5	100.5
Do.	10083	4	102.5	-	--	-	--	24.2	23.6	102.5
Do.	10094	-	--	4	97.2	-	--	28.1	28.9	97.2
Do.	10095	-	--	1	97.4	-	--	26.2	26.9	97.4
Do.	10097	-	--	1	92.9	-	--	25.0	26.9	92.9
Do.	10098	-	--	3	97.4	-	--	25.9	26.6	97.4
Do.	10100	-	--	3	116.0	-	--	10.9	9.4	116.0
Do.	11506	-	--	1	92.6	-	--	24.9	26.9	92.6
Do. Nebr. No. 1	--	-	--	2	95.5	-	--	27.8	29.1	95.5
Do. Nebr. No. 312	--	-	--	1	94.1	-	--	25.3	26.9	94.1
Do. Nebr. No. 1011	--	-	--	2	94.2	-	--	27.4	29.1	94.2
White Mediterranean	10023	2	127.2	-	--	-	--	30.4	23.9	127.2
Yogo	8033	-	--	3	109.6	20	110.9	21.7	19.5	111.3

SUMMARY OF AGRONOMIC DATA

The agronomic data other than yield have been summarized in tables 16 to 18. In each case the number of stations entering the average is shown. In general the data are neither so extensive nor so conclusive as in previous years.

Among the uniform varieties grown in the southern district (table 16) Nebraska No. 28 is outstanding in earliness, followed by Quivira and Tenmarq. In 1933, date of maturity had an important bearing on yield. Leaf-rust infection at two stations was very high for all varieties except Quivira, Kawvale, and Denton. Blackhull, as usual, had the highest test weight per bushel and was the only variety that averaged higher than 60 pounds.

Table 16. - Summary of agronomic data, other than yield, for the uniform winter-wheat varieties grown at the cooperating stations in the southern district in 1933

Variety	C.I. No.	Average			
		Dates Head- ed	Ripe	Plant height (In.)	Leaf rust (P.ct.)
Number of stations		4	4	4	2
Kharkof	1442	5-8	6-7	31.0	69
Kanred	5146	5-6	6-6	31.5	65
Nebraska No. 60	6250	5-9	6-8	30.3	71
Tenmarq	6936	5-4	6-6	32.0	58
Blackhull	6251	5-5	6-6	33.3	68
Quivira	8886	4-30	6-4	32.3	8
Kawvale	8180	5-3	6-4	31.3	6
Denton	8265	5-7	6-7	35.0	9
Fulcaster	6471	5-7 ¹ /	6-7 ¹ /	32.7 ¹ /	60
Harvest Queen	6199	5-5	6-7	35.3	61
Nebraska No. 28	5147	4-19	5-28	27.0	55

^{1/} Based on 3 stations only

For the central district (table 17) there is little difference between the varieties for winter hardiness. In this group of varieties, Quivira and Tenmarq were the earliest, while Nebraska No. 60 and Minturki were the latest. Test weights were low but Blackhull had the highest average and Tenmarq the lowest.

Table 17. - Summary of agronomic data, other than yield, for the uniform winter-wheat varieties grown at the cooperating stations in the central district in 1933

Variety	C. I. No.	Winter sur- vival (P.ct.)	Average			
			Dates Head- ed	Ripe	Plant height (In.)	Weight per bushel (Lbs.)
Number of stations		5	6	5	6	3
Kharkof	1442	90.0	6-2	7-1	32.3	54.1
Kanred	5146	90.4	6-1	7-1	32.7	53.6
Nebraska No. 60	6250	88.6	6-3	7-2	32.2	54.5
Tenmarq	6936	86.2	5-29	6-30	32.8	52.6
Blackhull	6251	82.6	5-30	7-1	32.8	56.8
Quivira	8886	82.2	5-27	6-29	32.8	54.5
Minturki	6155	92.6	6-3	7-2	33.5	52.8
Oro	8220	88.6	6-2	7-2	33.2	54.8
Cheyenne	8805	90.0	6-1	7-1	30.8	56.5
Kharkof (Hays No.2)	6686	91.6	6-2	7-2	32.3	54.3

In the northern district (table 18) very few data are available for averaging. Winter survival data were obtained on all varieties from two stations only (Havre and Moccasin) where winterkilling was severe. The winter hardy hybrids were much higher in survival than the standard nonhardy types. No outstanding differences occurred for time of maturity, height, or yield. Winter survival undoubtedly had an influence on yield in the region, but drought and heat also had an effect which in some cases may have been most important.

Table 18. - Summary of agronomic data, other than yield, for the uniform winter-wheat varieties grown at the cooperating stations in the northern district in 1933

Variety	C. I. No.	Winter survival (P.ct.)	Average			
			Dates Headed	Ripe	Plant height	Weight per bushel (Lbs.)
Number of stations		2	3	3	3	4
Kharkof	1442	12.5	6-25	7-25	27.3	61.2
Kanred	5146	19.5	6-25	7-25	27.3	61.3
Nebraska No. 60	6250	33.0	6-23	7-25	26.0	60.3
Minturki	6155	34.0	6-26	7-25	25.7	60.4
Minhardi x Minturki Do.	8034 8215	37.5 55.5	6-27 6-26	7-25	29.7 29.0	60.5 60.6
Yogo	8033	46.0	6-26	7-24	27.0	60.3
Minard x Minhardi	8889	41.0	6-23	7-25	28.3	60.8
Karmont	6700	6.5	6-25	7-24	26.7	60.7
Newturk	6935	11.5	6-24	7-24	28.0	60.6

UNIFORM YIELD NURSERY

As reported in the 1932 summary, a uniform yield nursery was started in the fall of 1931. This nursery was again seeded in the fall of 1932 at the following stations: Denton, Amarillo, Stillwater, Woodward, Manhattan, Hays, Colby, Akron, Ft. Collins, Lincoln, North Platte, and Alliance. The nursery is made up of 30 varieties sown in replicated 3-row block. The varieties included, together with the State and C. I. numbers are shown in table 19.

Table 19. - Varieties of winter wheat grown as a uniform yield nursery, 1933

Variety	C. I. No.	State or Hybrid No.
Kharkof	1442	--
Blackhull	6251	--
Nebraska No. 60	6250	--
Early Blackhull	8856	--
Turkey sel.	10083	Oklahoma No. 1
Sibley No. 81	10084	--
Mediterranean sel.	10085	Texas No. 5933-20
Do.	10086	Texas No. 3015-81
Kanred x Marquis	11374	Kansas No. 2679
P1066-1 x Burbank	10087	--
Beloglina sel.	8884	North Platte No. 11
Kanred x Minturki	10012	North Platte No. 14
Minturki x Beloglina-Buffum	10088	19115 VI-14
Tenmarq sel.	10089	Kansas No. 2670
Fulhard	8257	--
Kanred x Marquis	10090	Kansas No. 2644
Kanred x Hard Federation	11373	Kansas No. 2671
Do.	10091	Kansas No. 2672
Do.	10092	Kansas No. 2673
Do.	10093	Kansas No. 2674
Turkey sel.	10015	Nebraska No. 1062
Do.	10016	Nebraska No. 1069
Do.	10094	Nebraska No. 1063
Do.	10095	Nebraska No. 1065
Do.	10096	Nebraska No. 1066
Do.	10097	Nebraska No. 1068
Do.	10098	Nebraska No. 1070
Kanred sel.	10099	Colorado No. 0166
Turkey sel.	10100	Colorado No. 159
Do.	11375	Colorado No. 351

Only three varieties included as uniform varieties in the plot tests are grown in the nursery. These are Kharkof, Blackhull, and Nebraska No. 60. The object of the nursery is twofold (1) to obtain as much information as possible on new strains that may later be included in the uniform plot tests and (2) to obtain data on the various characters influencing yield. Because of the second objective an attempt was made to include a few varieties differing in such characters as time of maturity, strength of straw, winter hardiness, and disease resistance. The remainder of the nursery is composed of varieties and strains that are outstanding at one or more stations and on which more data are desired.

DATA OBTAINED

In table 20 the agronomic data for 10 of the nurseries are given. No data were obtained at Amarillo because the crop was too short and stands too poor to harvest. At Colby the nursery was completely destroyed by drought and cold weather. For each station the varieties are listed in the table in the order of yield for 1933. The average yield and rank for the 2-year period 1932-1933 is shown. Only those agronomic data are given which seemed to show differences or have an influence on yield.

The data as presented are self-explanatory. At Denton an early winter freeze and a very heavy epidemic of leaf rust undoubtedly influenced yields. At Woodward, Manhattan, and Hays hot, dry weather just prior to harvest reduced yields and quality. At Lincoln, North Platte, Alliance, and Akron winter hardiness seemed to influence yield. At Lincoln chinch bug injury was an important factor. Due to lack of fall moisture stands at Ft. Collins were very spotted and there was much spring germination. For this reason these yields are not included in the averages. Under normal conditions the yields at Ft. Collins should be valuable in showing the yielding capacity of varieties under very favorable conditions.

Denton, Texas

Table 20. - Agronomic and other data for the uniform winter-wheat varieties grown in replicated nursery plots in cooperative experiments at 10 experiment stations in the winter wheat area, 1933 (4 plots seeded Oct., 1932; emerged Oct. 14, 1932)

Variety	C. I. No.	Sur- vival of late freeze (P.cu.)	Dates Head- ripe ed	Plant height	Lodging (In.)	Stand at harvest	Rust			Acre yield (Bu.)			Average yield 1932-33	
							(P.ct.)	(P.ct.)	(P.ct.)	Bu. per acre	Rank			
Kanred x Hard Federation	10092	95	6-4	34	6	36	48	15	31.1	1				
Early Blackhull	8856	89	5-2	36	4	89	75	1	29.7	4				
Kanred x Hard Federation Do.	11373	95	4-27	34	18	84	45	23	29.0	25				
P1066-1 x Burbank Mediterranean sel.	10087	97	5-2	33	3	76	35	16	29.5	2				
Kanred x Hard Federation Fullhard	10085	97	4-29	35	3	83	48	5	31.0	3				
Turkey sel.	10091	98	5-6	36	13	90	35	13	28.0	4				
Kanred x Marquis Mediterranean sel.	8257	95	4-30	34	14	89	33	16	28.6	5				
Kanred sel.	10083	97	5-16	35	2	90	51	24	28.2	6				
Kanred x Minturki Beloglina sel.	11374	62	5-11	4	1	4	4	0	25.0	7				
Sibley No. 81	10086	85	5-5	4	4	5	4	4	24.4	8				
Blackhull	10090	95	5-9	5	4	4	4	4	26.2	9				
Temarrq Kharkof	10099	98	5-7	5	4	4	4	4	26.8	10				
Turkey sel.	10012	99	5-10	5	4	6	16	3	23.4	11				
Nebraska No. 60	18934	100	5-13	6	6	37	10	5	23.0	12				
Turkey sel.	10084	79	5-13	5	6	36	16	3	22.7	13				
Minturki x Beloglina-Buffum Turkey sel.	6251	97	5-8	5	6	36	15	8	22.2	14				
Do.	1442	98	5-12	5	7	36	15	8	23.8	15				
Turkey sel.	10094	99	5-10	5	7	36	16	9	24.6	16				
Do.	10095	99	5-10	5	7	36	16	9	24.6	17				
Turkey sel.	6250	97	5-13	5	7	36	16	9	24.6	18				
Minturki x Beloglina-Buffum Turkey sel.	10100	97	5-10	5	7	36	16	9	24.6	19				
Do.	10088	100	5-12	5	8	34	16	9	24.6	20				
Turkey sel.	10016	95	5-8	5	8	30	16	9	24.6	21				
Do.	10098	99	5-11	5	8	29	16	9	24.6	22				
Do.	11375	99	5-11	5	7	32	16	7	24.6	23				
Do.	10015	98	5-11	5	7	30	16	7	24.6	24				
Do.	10096	99	5-10	5	7	30	16	7	24.6	25				
Do.	10097	99	5-10	5	7	30	16	7	24.6	26				

Probable error of a difference 1.7 bu.; probable error of a mean 1.2 bu. or 5.87 percent

Table 20. - (Continued)

Stillwater, Okla.

(Four plots)

Variety	C. I. No.	Dates		Height (In.)	Test weight per bu. (Lbs.)	Acre yield (Bu.)	Av. yield 1932-33	
		Head- ed	Ripe				Bu. per acre	Rank
Kanred x Hard Federation	10092	4-24	6-2	37	60.0	44.5	42.3	1
Do.	11373	4-23	6-2	35	60.0	42.8	38.4	8
Do.	10093	4-22	6-2	35	60.0	42.6	35.9	18
Do.	10091	4-22	6-2	36	60.2	40.7	38.0	10
P1066-1 x Burbank	10087	4-27	6-3	37	60.5	40.3	36.4	17
Kanred x Marquis	10090	4-29	6-3	39	54.0	40.3	38.0	10
Turkey sel.	10015	4-30	6-4	36	60.8	38.6	39.3	4
Do.	10097	4-29	6-3	36	59.8	38.5	38.7	6
Tenmarq sel.	10089	4-27	6-4	38	59.0	37.8	39.7	3
Sibley No. 31	10084	5-1	6-4	40	60.9	37.6	35.7	19
Early Blackhull	8856	4-15	6-3	36	60.6	37.4	30.8	27
Fulhard	8257	4-29	6-4	38	60.8	37.1	34.0	24
Turkey sel.	10094	4-27	6-3	37	60.2	37.1	39.1	5
Do.	10100	4-29	6-3	36	58.0	37.1	40.3	2
Beloglina sel.	8884	5-1	6-4	36	58.0	36.4	33.3	26
Turkey sel.	10083	5-1	6-4	38	58.0	36.4	38.7	6
Do.	10016	4-27	6-3	36	59.0	36.3	37.6	13
Kanred sel.	10099	4-30	6-3	38	58.7	36.1	37.8	12
Turkey sel.	10095	5-1	6-4	35	60.0	35.8	37.1	14
Do.	10096	4-27	6-3	35	60.6	35.4	35.1	20
Nebraska No. 60	6250	5-2	6-5	37	58.5	35.3	36.5	16
Blackhull	6251	4-30	6-4	38	61.0	34.6	33.9	25
Turkey sel.	10098	4-27	6-3	36	59.0	34.4	35.0	21
Mediterranean sel.	10085	4-27	6-3	38	59.3	33.6	29.0	28
Turkey sel.	11375	5-1	6-1	35	59.0	33.6	38.1	9
Kharkof	1442	5-2	6-4	35	58.0	31.6	37.0	15
Kanred x Minturki	10012	5-1	6-5	37	55.0	29.0	34.8	23
Kanred x Marquis	11374	4-24	6-2	35	58.6	28.9	21.0	30
Mediterranean sel.	10086	4-30	6-4	37	60.0	27.7	26.7	29
Minturki x Beloglina-Buffum	10088	5-3	6-4	37	56.0	26.6	35.0	21

Probable error of a difference 1.8 bu.; probable error of a mean 1.3 bu. or 3.48 percent

Table 20. - (Continued)

Woodward, Okla.

(Four plots; seeded Oct. 17, 1932; emerged Oct. 27, 1932)

Variety	C. I. No.	Dates		Height (In.)	Test weight per bu. (Lbs.)	Acre yield (Bu.)	Av. yield 1932-33	
		Headed	Ripe				Bu. per acre	Rank
Turkey sel.	10096	5-5	6-8	24	59.5	19.3	30.4	1
P1066-1 x Burbank	10087	5-5	6-8	25	59.0	18.5	27.2	13
Turkey sel.	10095	5-7	6-9	24	59.0	18.3	29.3	2
Do.	10100	5-7	6-8	27	58.0	18.3	29.0	3
Do.	10016	5-3	6-8	26	60.0	18.2	28.7	6
Do.	10098	5-4	6-8	25	59.5	18.0	28.0	10
Do.	10094	5-6	6-8	25	59.5	17.8	27.0	14
Kanred sel.	10099	5-7	6-9	26	58.5	17.8	27.5	12
Turkey sel.	10097	5-5	6-8	25	59.0	17.7	28.3	9
Do.	10015	5-5	6-8	26	60.0	17.4	26.9	15
Do.	11375	5-9	6-9	25	59.0	16.8	26.8	17
Beloglina sel.	8884	5-8	6-9	27	58.0	16.5	28.9	4
Turkey sel.	10083	5-7	6-9	25	58.0	16.3	27.6	11
Kharkof	1442	5-8	6-9	27	57.5	16.1	28.5	7
Nebraska No. 60	6250	5-8	6-10	27	58.0	16.1	28.8	5
Tenmarq sel.	10089	5-4	6-6	27	58.0	15.7	26.9	15
Kanred x Hard Federation	10092	5-2	6-7	22	60.0	15.7	28.4	8
Minturki x Beloglina-Buffum	10088	5-9	6-12	27	56.5	15.5	24.9	21
Kanred x Minturki	10012	5-9	6-12	26	55.5	14.9	23.4	26
Kanred x Hard Federation	11373	5-1	6-8	25	60.5	14.9	23.9	25
Fulhard	8257	5-4	6-10	27	60.0	14.7	24.1	24
Blackhull	6251	5-6	6-11	27	61.0	14.1	24.5	23
Sibley No. 81	10084	5-7	6-8	27	59.0	13.9	25.2	19
Early Blackhull	8856	4-22	6-3	24	61.5	13.6	23.0	28
Kanred x Hard Federation	10091	4-27	6-7	23	61.0	13.5 ¹	24.8	22
Kanred x Marquis	10090	5-5	6-8	27	--	13.0	25.2	19
Mediterranean sel.	10085	5-4	6-3	26	58.5	12.9	23.4	26
Kanred x Marquis	11374	5-3	6-9	24	60.5	12.8	21.8	29
Kanred x Hard Federation	10093	4-26	6-7	22	60.5	12.6 ¹	25.4	18
Mediterranean sel.	10086	5-8	6-12	27	57.5	11.9	21.1	30

Probable error of a difference 1.2 bu.; probable error of a mean 0.9 bu. or 5.60 percent

^{1/} Damaged by rodents before cutting.

Table 20. - (Continued)

Manhattan, Kans.

(Three plots)

Variety	C. I. No.	Spring con- dition (P.ct.)	Date headed (In.)	Height (Lbs.)	Test weight per bu.	Ker- nel plump- ness (P.ct.)	Protein (P.ct.)	Acre yield (Bu.)	Av.yield 1932-33 Bu. per acre	Rank	Remarks
Turkey sel.	98	5-20	33	53.4	62	13.65	28.5	42.4	6	6-7	Appears inferior
Fulhard	95	5-18	35	55.1	77	16.70	27.5	38.4	18	--	--
Kanred x Hard Federation	93	5-15	34	54.5	73	--	26.7	43.2	3	--	--
Turkey sel.	95	5-20	36	50.3	63	--	26.1	37.9	19	--	--
Do.	98	5-18	34	52.9	77	17.25	26.0	43.1	4	6-7	Looks good
Early Blackhull	90	5-11	37	57.1	65	--	25.9	41.5	8	--	--
Turkey sel.	98	5-20	33	52.3	72	--	25.7	42.9	5	6-7	Appears inferior
Do.	95	5-19	35	53.6	67	--	25.6	38.8	17	6-7	Looks good
Kanred x Hard Federation	93	5-15	34	53.4	72	16.60	25.3	42.2	17	5-24	Appears best of Kanred x Hard Federation selections
Turkey sel.	98	5-19	34	53.1	62	--	25.1	39.7	12	6-7	Appears inferior
Do.	95	5-18	34	53.2	63	--	25.0	40.8	10	6-7	Looks good
P1066-1 x Burbank	95	5-18	34	51.5	57	19.35	24.7	41.4	9	6-7	Erect, good vigor
Turkey sel.	93	5-20	35	51.1	58	--	24.6	36.9	20	--	--
Do.	98	5-18	32	53.0	63	--	24.1	39.6	13	6-7	Appears inferior
Blackhull	95	5-18	35	53.4	68	18.15	23.7	39.5	14	--	--
Kanred x Hard Federation	90	5-14	34	53.3	68	12.55	22.5	39.5	14	6-7	Appears driest of Kanred x Hard Federation selections
Kanred x Marquis	93	5-20	37	48.9	47	18.65	22.1	39.0	16	--	--
Kanred x Hard Federation	88	5-14	33	53.2	63	17.15	22.0	43.8	1	5-24	Looks poorest of Kanred x Hard Federation selections
Nebraska No. 60	98	5-22	36	50.2	62	18.75	21.9	36.7	21	--	--
Kanred sel.	95	5-21	35	48.8	57	--	21.9	40.0	11	--	--
Turkey sel.	98	5-21	34	51.4	50	--	21.9	34.5	25	--	--
Mediterranean sel.	93	5-18	34	54.0	65	--	21.6	33.4	26	6-12	Looks good
Tennarq sel.	93	5-18	35	48.3	47	--	21.0	43.3	2	--	--
Sibley No. 81	90	5-20	35	52.9	62	--	20.0	35.1	24	--	--
Beloglina sel.	95	5-21	35	48.8	53	--	19.65	19.1	23	--	--
Kharkof	98	5-21	34	49.6	62	--	18.6	32.5	27	--	--
Kanred x Mintturki	95	5-23	36	45.0	42	--	15.9	30.5	28	--	--
Kanred x Marquis	90	5-17	32	51.4	68	--	15.8	36.5	22	--	--
Mintturki x Beloglina-Buffum	95	5-23	36	45.5	43	19.00	13.8	30.5	28	--	--
Mediterranean sel.	90	5-21	31	49.8	60	--	10.5	29.3	30	6-3	Poor variety

Probable error of a difference 1.8 bu.; probable error of a mean 1.3 bu. or 5.75 percent

Table 20. - (Continued)

Hays, Kans.

(Three plots)

Variety	C. I. No.	Winter sur- vival	Dates		Height (In.)	Acre yield (Bu.)	Average yield 1932-33		Rank
			Head- ed	Ripe			Bu. per acre		
			(P.ct)		(In.)	(Bu.)			
Kanred x Hard Federation	10092	99	5-10	6-13	32	28.0	33.6	7	
Do.	10091	92	5-9	6-12	30	26.2	35.0	2	
Do.	10093	98	5-9	6-11	30	25.4	30.1	13	
Do.	11373	98	5-10	6-12	31	24.7	33.0	8	
Kanred x Marquis	10090	99	5-17	6-15	33	22.9	34.4	4	
Early Blackhull	8856	96	5-8	6-10	33	22.4	31.8	10	
Fulhard	8257	99	5-15	6-15	33	22.4	34.2	5	
P1066-1 x Burbank	10087	92	5-16	6-14	30	20.5	36.1	1	
Blackhull	6251	99	5-15	6-13	32	19.4	34.2	5	
Turkey sel.	10096	100	5-16	6-16	28	18.5	26.4	20	
Tenmarq sel.	10089	99	5-13	6-13	31	18.2	34.7	3	
Turkey sel.	10083	100	5-17	6-14	30	18.1	32.9	9	
Kanred x Marquis	11374	88	5-11	6-13	31	18.1	29.5	16	
Sibley No. 81	10084	98	5-19	6-14	31	18.0	28.0	19	
Beloglina sel.	8884	99	5-20	6-16	32	17.9	30.8	11	
Mediterranean sel.	10085	97	5-14	6-14	31	17.2	26.6	27	
Turkey sel.	10094	100	5-17	6-16	29	17.6	30.1	13	
Do.	10100	100	5-16	6-15	29	17.6	27.5	22	
Do.	10015	100	5-17	6-16	29	17.2	25.9	30	
Do.	10095	100	5-17	6-16	28	17.2	28.1	18	
Kanred sel.	10099	100	5-18	6-14	29	17.1	27.7	21	
Mediterranean sel.	10086	96	5-17	6-14	31	16.2	29.4	17	
Turkey sel.	10098	100	5-14	6-12	29	16.0	29.8	15	
Do.	10016	100	5-15	6-13	28	15.8	27.9	20	
Do.	10097	100	5-17	6-16	29	15.7	26.8	25	
Do.	11375	100	5-20	6-16	29	15.2	30.2	12	
Kanred x Minturki	10012	100	5-21	6-16	32	15.0	27.1	24	
Minturki x Beloglina-Buffum	10088	100	5-21	6-16	32	14.8	27.4	23	
Kharkof	1442	100	5-20	6-17	28	14.2	26.3	29	
Nebraska No. 60.	6250	100	5-20	6-17	28	13.3	26.8	25	

Probable error of a difference 1.3 bu.; probable error of a mean 1.0 bu. or 5.08 percent

Table 20. - (Continued)

Lincoln, Nebr.

(Three plots; seeded Oct. 4, 1932; emerged Oct. 13, 1932)

Variety	C. I.	Winter	Date	Height	Chinch	Acre	Av. yield 1932-33	Rank
	No.	sur- vival	headed	(In.)	bub toler- ance	yield (Bu.)	Bu. per acre	
			(Pct.)		(Score)			
Sibley No. 81	10084	97	6-1	30	75	15.5	26.8	10
Fulhard	8257	96	6-1	29	73	12.6	32.3	1
Turkey sel.	10083	95	6-3	28	83	11.4	22.9	23
Kanred x Hard Federation	10093	83	5-28	26	67	11.4	24.6	18
Do.	10091	77	5-29	26	77	10.7	24.4	20
Turkey sel.	10092	90	6-2	26	62	10.7	27.1	6
Do.	10094	94	6-2	26	65	9.9	27.0	8
Nebraska No. 60	6250	97	6-4	28	75	9.8	21.8	24
Turkey sel.	10015	97	6-2	27	62	9.7	25.0	16
Do.	11375	94	6-3	27	77	9.6	32.7	2
Mediterranean sel.	10085	83	6-1	29	57	9.5	23.7	22
Kharkof	1442	90	6-4	27	83	9.3	20.8	25
Mediterranean sel.	10086	87	6-2	28	70	9.2	25.4	14
Turkey sel.	10016	96	6-1	27	60	8.9	27.1	6
P1066-1 x Burbank	10087	90	6-2	26	81	8.6	31.2	3
Turkey sel.	10100	93	6-3	28	78	8.6	26.6	11
Tenmarq sel.	10089	90	5-31	28	63	8.3	27.0	8
Kanred x Hard Federation	10092	80	5-28	26	68	8.3	19.6	28
Kanred x Marquis	10090	85	6-2	29	67	8.2	20.4	27
Kanred sel.	10099	90	6-4	28	86	8.2	26.0	13
Kanred x Minturki	10012	98	6-4	28	75	8.0	25.0	16
Minturki x Beloglina-Buffum	10088	99	6-5	28	66	8.0	26.1	12
Early Blackhull	3856	80	5-26	28	90	7.9	29.4	4
Turkey sel.	10098	95	6-1	27	60	7.7	25.2	15
Blackhull	6251	80	6-2	28	62	7.5	29.2	5
Kanred x Hard Federation	11373	80	5-29	26	60	7.4	16.5	30
Beloglina sel.	8884	97	6-4	26	75	7.0	24.1	21
Turkey sel.	10097	87	6-2	26	60	6.9	24.6	18
Do.	10096	88	6-2	26	62	6.0	20.6	26
Kanred x Marquis	11374	67	6-2	26	50	5.2	16.7	29

Probable error of a difference 1.2 bu.; probable error of a mean 0.9 bu. or 9.57 percent

Table 20. - (Continued)

North Platte, Nebr.

(Three plots; seeded Sept. 15, 1932, emerged Sept. 21, 1932)

Variety	C. I. No.	Winter sur- vival (P.ct.)	Dates		Height (In.)	Acre yield (Bu.)
			Headed	Ripe		
Beloglina sel.	8884	100	6-1	6-30	36	35.5
Nebraska No. 60	6250	95	6-1	7-2	35	35.4
Turkey sel.	10100	100	5-31	6-30	37	35.1
Kharkof	1442	100	6-1	7-2	34	34.5
P1066-1 x Burbank	10087	100	6-1	6-30	35	33.2
Turkey sel.	11375	100	6-1	7-1	35	33.2
Fulhard	8257	85	5-27	6-30	36	33.1
Kanred x Hard Federation	10091	95	5-23	6-30	32	33.1
Minturki x Beloglina-Buffum	10088	95	6-1	6-30	36	32.7
Kanred x Hard Federation	10092	90	5-24	6-30	34	32.2
Do.	10093	95	5-23	6-30	33	31.9
Kanred sel.	10099	100	6-1	6-30	36	31.4
Turkey sel.	10015	100	5-30	6-30	35	30.1
Kanred x Minturki	10012	100	6-1	6-30	37	30.0
Blackhull	6251	85	5-31	6-30	35	29.7
Turkey sel.	10095	95	6-1	6-30	33	29.7
Do.	10096	95	5-30	7-1	32	29.6
Do.	10094	100	5-31	6-30	32	29.1
Kanred x Hard Federation	11373	80	5-26	6-30	33	28.9
Tenmarq sel.	10089	80	5-27	6-30	35	28.7
Turkey sel.	10083	100	6-1	7-1	35	28.1
Do.	10098	100	5-28	6-30	34	27.9
Sibley No. 81	10084	90	6-1	7-1	34	27.8
Turkey sel.	10016	100	5-27	6-30	34	27.7
Kanred x Marquis	10090	80	6-1	7-1	35	26.1
Turkey sel.	10097	90	6-1	6-30	33	25.9
Early Blackhull	8856	85	5-22	6-30	34	24.1
Mediterranean sel.	10086	95	6-1	7-3	32	23.6
Do.	10085	85	5-31	6-30	31	21.3
Kanred x Marquis	11374	75	5-30	7-1	32	20.9

Probable error of a difference 1.6 bu.; probable error of a mean 1.1 bu. or 3.70 percent

Table 20. - (Continued)

Alliance, Nebr.

(Three plots)

Variety	C. I. No.	Winter sur- vival (P.ct)	Dates		Height (In.)	Acre yield (Bu.)	Av. yield 1932-33	
			Headed	Ripe			Bu. per acre	
Kanred x Minturki	10012	45	6-17	7-12	23	13.7	22.0	1
Minturki x Beloglina-Buffum	10088	50	6-17	7-13	23	12.2	20.0	6
Turkey sel.	10100	28	6-17	7-21	25	12.0	20.6	5
Kanred x Hard Federation	11373	13	6-14	7-14	25	11.9	16.9	17
Turkey sel.	10015	33	6-17	7-13	26	11.5	18.4	12
Kanred x Marquis	10090	25	6-15	7-12	26	11.3	18.6	11
Kharkof	1442	37	6-17	7-13	25	11.1	21.4	3
Beloglina sel.	8884	40	6-15	7-11	23	10.5	19.9	7
Turkey sel.	10094	33	6-15	7-12	26	10.5	18.9	10
Do.	10095	32	6-16	7-12	26	10.0	16.4	20
Do.	10083	33	6-15	7-14	24	9.3	19.5	8
P1066-1 x Burbank	10087	32	6-14	7-11	22	9.3	17.6	14
Turkey sel.	10016	35	6-14	7-11	26	9.2	16.5	19
Do.	10098	30	6-16	7-12	25	9.2	17.8	13
Kanred sel.	10099	25	6-17	7-15	25	9.1	20.8	4
Turkey sel.	11375	32	6-17	7-17	28	9.1	21.6	2
Nebraska No. 60	6250	38	6-17	7-14	24	9.0	17.5	15
Turkey sel.	10097	25	6-16	7-14	28	8.7	19.0	9
Kanred x Hard Federation	10093	23	6-14	7-14	25	8.2	14.6	24
Turkey sel.	10096	35	6-16	7-14	26	8.0	17.2	16
Blackhull	6251	23	6-13	7-13	26	7.2	16.9	17
Kanred x Hard Federation	10091	15	6-14	7-14	25	7.2	13.4	26
Fulhard	8257	25	6-14	7-14	24	6.6	15.6	21
Kanred x Marquis	11374	18	6-15	7-12	26	6.1	12.7	27
Mediterranean sel.	10086	8	6-16	7-17	-	5.5	11.1	29
Kanred x Hard Federation	10092	13	6-15	7-18	-	5.5	14.9	22
Tenmarq sel.	10089	33	6-14	7-13	23	5.3	14.8	23
Early Blackhull	8856	20	6-9	7-10	25	4.9	13.6	25
Sibley No. 81	10084	10	6-16	7-16	26	3.4	9.6	30
Mediterranean sel.	10085	3	6-16	-	-	2.5	11.4	28

Portable error of a difference 2.0 bu.; probable error of a mean 1.4 bu. or 16.70 percent

Table 20. - (Continued)

Akron, Colo.

(Three plots; seeded Sept. 22, 1932; emerged Sept. 30, 1932)

Variety	C. I. No.	Winter sur- vival	Dates		Height (In.)	Acre yield (Bu.)
			Headed	Ripe		
		(P.ct.)				
Turkey sel.	10100	60	6-15	7-21	25	13.6
Blackhull	6251	48	6-13	7-22	23	11.3
Turkey sel.	10098	70	6-13	7-19	21	10.8
Do.	10097	62	6-15	7-20	23	10.7
Kanred x Hard Federation	10093	62	6-12	7-19	22	10.4
Kanred sel.	10099	70	6-15	7-21	22	10.4
Turkey sel.	10094	53	6-13	7-20	22	10.2
Do.	10095	55	6-15	7-20	23	9.8
Do.	11375	50	6-17	7-23	24	9.6
Kanred x Hard Federation	10091	50	6-12	7-20	23	8.9
Nebraska No. 60	6250	73	6-17	7-21	23	8.8
Mediterranean sel.	10085	38	6-16	7-22	22	8.7
Fulhard	8257	47	6-15	7-22	22	8.6
Kharkof	1442	70	6-16	7-20	22	8.1
P1066-1 x Burbank	10087	52	6-15	7-21	22	8.1
Turkey sel.	10015	55	6-16	7-22	22	8.0
Mediterranean sel.	10086	38	6-16	7-21	22	7.9
Kanred x Hard Federation	10092	45	6-12	7-19	22	7.9
Early Blackhull	8856	33	6-11	7-22	21	7.7
Turkey sel.	10096	55	6-14	7-19	23	7.5
Kanred x Marquis	10090	47	6-16	7-21	24	7.3
Turkey sel.	10016	43	6-14	7-21	23	7.2
Sibley No. 81	10084	30	6-16	7-21	24	7.2
Kanred x Hard Federation	11373	52	6-11	7-21	23	7.2
Minturki x Beloglina-Buffum	10088	50	6-17	7-22	23	6.8
Turkey sel.	10083	38	6-17	7-20	22	6.7
Beloglina sel.	8884	37	6-16	7-21	21	5.9
Kanred x Minturki	10012	57	6-17	7-21	21	5.9
Kanred x Marquis	11374	47	6-13	7-20	22	5.6
Tenmarq sel.	10089	45	6-14	7-22	24	5.0

Probable error of a difference 1.3 bu.; probable error of a mean 0.9 bu. or 10.74 percent

Table 20. - (Continued)

Ft. Collins, Colo.

(Five plots)

Variety	C. I. No.	Percent Stand		Height (In.)	Acre yield (Bu.)
		March 30	June 8		
Turkey sel.	11375	43	47	35	47.0
Do.	10098	21	34	31	36.4
Minturki x Beloglina-Buffum	10088	26	38	36	36.1
Kanred sel.	10099	13	25	34	35.6
Kanred x Minturki	10012	25	34	35	35.5
Turkey sel.	10083	8	18	32	34.2
Do.	10095	25	32	32	33.3
Do.	10100	30	41	32	32.7
Kanred x Marquis	10090	24	27	35	32.6
Turkey sel.	10094	10	17	30	30.2
Kharkof	1442	4	22	32	28.9
Beloglina sel.	8884	3	17	32	28.6
P1066-1 x Burbank	10087	18	24	30	26.7
Turkey sel.	10097	16	28	31	26.4
Termarq sel.	10089	16	21	31	26.2
Sibley No. 81	10084	14	19	34	25.5
Fulhard	8257	19	23	35	25.1
Turkey sel.	10096	8	12	30	24.7
Do.	10015	3	15	31	23.9
Do.	10016	4	20	30	22.9
Kanred x Marquis	11374	20	26	29	21.5
Kanred x Hard Federation	11373	13	20	28	21.1
Blackhull	6251	10	17	32	21.1
Nebraska No. 60	6250	5	18	32	20.0
Kanred x Hard Federation	10091	13	20	25	17.3
Do.	10093	2	17	26	17.3
Mediterranean sel.	10085	13	18	31	16.4
Do.	10086	5	11	32	15.9
Early Blackhull	8856	6	15	29	14.8
Kanred x Hard Federation	10092	4	11	26	13.8

Probable error of a difference 4.7 bu.; probable error of a mean 3.3 bu. or 12.46 percent

PROBABLE ERRORS

Probable errors were calculated by "Student's" generalized formula as outlined on page 21 of this summary. In table 21 the number of plots, average yield, and probable errors for each station are given.

Table 21. - Average yield, probable error of a difference, and generalized probable error of a mean for the uniform nursery at each cooperating station, 1933

Station	N Number of plots	Av.yield of varieties (Bu. per acre)	Probable error of a difference (Bu.)	Probable error of a mean	
				Bu.	Percent
Texas:					
Denton	4	21.0	1.7	1.2	5.87
Oklahoma:					
Stillwater	4	36.1	1.8	1.3	3.48
Woodward	4	15.7	1.2	0.9	5.60
Kansas:					
Manhattan	3	22.5	1.8	1.3	5.75
Hays	3	18.7	1.3	1.0	5.08
Nebraska:					
Lincoln	3	9.0	1.2	0.9	9.57
North Platte	3	29.7	1.6	1.1	3.70
Alliance	3	8.6	2.0	1.4	16.70
Colorado:					
Akron	3	8.4	1.3	0.9	10.74
Ft. Collins	5	26.4	4.7	3.3	12.52

SUMMARY OF NURSERY YIELDS

The varietal yields from the 10 nurseries are summarized in table 22. The varieties are listed in order of average yield at 9 stations, Ft. Collins being excluded because of spring germination. These averages mean little since they show only ^{how} widely a variety is adapted. The data have been averaged by States and the rank within the States is also shown. This makes possible the study of the behavior of a variety from south to north. The behavior of Kanred x Hard Federation (C. I. 10092) is interesting in that it ranked first at Denton, Texas, and in Oklahoma and Kansas, while it was low in Nebraska and at Akron, Colo., and last at Ft. Collins. Two other Kanred x Hard Federation strains (C. I. 10093 and 11373) made good showings at the southern group of stations. P1066-1 x Burbank, which ranked first last year, was fourth this year. Fifteen new varieties ranked above Nebraska No. 60 and Blackhull and 19 above Kharkof. The averages show that in most cases the three check varieties were exceeded in yield by the newer productions.

Table 22. - Summary of average yields of the 30 winter-wheat varieties grown as uniform yield mixtures at 10 stations in the hard red winter wheat region, 1933

Variety	C. I. No.	Texas		Oklahoma			Kansas			Nebraska			Colorado			Average 9 stations 1/		
		Bu. per acre	Rank	Still- water	Wood- ward	Average	Rank	Mar- kham	Hayes	Average	Rank	North Lincoln Platte	North Lincoln Platte	St. Collins Branch	Pt. Collins Branch	Per acre	Rank	
Lared x Hard Federation	10092	31.1	1	44.5	15.7	30.1	1	26.7	24.0	25.4	7	8.3	19	7.9	17	13.8	30	
Do.	10093	29.0	4	42.6	12.6	27.6	7	24.7	25.7	25.7	3	11.4	8	10.4	5	17.3	25	
11353	29.6	3	42.8	14.9	28.9	3	24.7	20.5	22.4	9	8.6	26.9	16.1	17	7.2	21.1	22	
P1066-1 x Burbank	10087	28.5	5	40.3	18.5	29.4	2	24.7	20.5	22.4	4	12.6	33.2	9.3	11	8.1	14	21.6
Fulhard	8257	26.4	8	37.1	14.7	25.9	19	27.5	25.0	25.0	6	17.4	6	8.6	13	25.1	13	
Lared x Hard Federation	10091	26.6	7	40.7	13.5	27.1	11	22.0	26.2	24.1	6	10.7	33.1	7.2	11	8.9	10	21.0
Turkey sel.	10100	16.6	22	37.1	18.3	27.7	6	24.6	21.6	21.1	15	8.6	35.1	12.0	11	13.6	1	21.0
Do.	10083	25.0	9	36.4	16.3	26.4	17	26.1	16.1	22.1	11	11.4	28.1	9.3	16.3	15	6.7	26
Do.	10095	16.9	21	35.8	18.3	27.1	11	28.5	17.2	22.9	8	10.7	29.7	10.0	16.8	13	9.8	8
Do.	10094	17.5	19	37.1	17.8	27.5	8	25.7	17.6	21.7	12	9.9	29.1	10.5	14	10.2	7	19.7
Lared x Marquis	10090	23.4	12	40.3	13.0	26.7	15	21.1	22.9	22.5	10	8.2	26.1	11.3	15.2	21	32.6	9
Lared sel.	10099	23.0	13	36.1	17.8	27.0	13	21.9	17.1	19.5	21	8.2	31.4	9.1	16.2	16	10.4	5
Early Blacktail 1	8856	29.9	2	37.4	13.6	25.5	22	25.9	22.4	24.2	5	7.9	24.1	4.9	12.3	28	7.7	19
Beloglina sel.	8854	22.2	15	36.4	16.5	26.5	16	19.1	17.9	16.5	24	7.0	35.5	10.5	17.7	4	5.9	27
Turkey sel.	10015	12.1	28	38.6	17.4	28.0	5	25.6	17.2	26.4	2	9.7	30.1	11.5	17.1	10	8.0	16
Nebraska No. 60	6250	16.6	22	39.3	16.1	25.7	21	21.9	13.3	17.6	25	9.8	35.4	9.0	18.1	3	8.6	11
Blacktail 1	6251	19.3	17	34.6	14.1	24.4	24	23.7	19.4	21.6	13	7.5	29.7	7.2	14.8	23	11.3	2
Sibley No. 61	10084	20.9	16	37.6	13.9	25.8	20	18.0	19.0	22	15.5	27.8	3.4	15.6	18	7.2	22	18.5
Turkey sel.	10098	14.0	26	34.4	18.0	26.2	16	26.0	16.0	21.0	16	7.7	27.9	9.2	22	10.8	3	16.2
Do.	113375	13.5	27	33.6	16.8	25.2	23	21.9	15.2	18.6	23	9.6	33.2	9.1	17.3	7	9.6	9
Do.	10016	14.1	25	26.3	18.2	27.3	10	25.0	15.5	20.4	17	8.9	27.7	9.2	15.3	19	7.2	20
Kharof	1442	17.5	19	31.6	16.1	23.9	25	15.6	14.2	16.4	27	9.3	34.5	11.1	18.3	2	8.1	14
Turkey sel.	10097	11.2	29	38.5	17.7	28.1	4	25.1	15.7	20.4	17	6.9	25.9	8.7	13.8	26	10.7	4
Do.	10096	11.2	29	35.4	19.3	27.4	9	24.1	18.5	21.3	14	6.0	29.6	8.0	14.5	20	7.5	18
Tomarq sel.	10089	18.0	14	37.8	15.7	26.8	14	21.0	18.2	19.6	20	8.3	28.7	5.3	14.1	25	5.0	30
Mediterranean sel.	10085	28.0	6	35.6	12.9	23.3	26	21.0	18.0	19.6	19	9.5	21.3	2.5	11.1	29	8.7	12
Kenred x Minturki	10012	22.7	14	29.0	14.9	22.0	27	15.9	15.0	15.5	26	8.0	30.0	13.7	17.2	8	5.9	27
Minturki x Beloglina-Buffum	10088	16.0	24	26.6	15.5	21.1	28	13.8	14.3	29	8.0	32.7	12.2	17.6	5	6.8	25	36.1
Xanred x Marquis	11374	24.4	10	28.9	12.8	20.9	29	15.8	16.1	17.0	26	5.2	20.9	6.1	10.7	30	5.6	21
Mediterranean sel.	10086	24.3	11	27.7	11.9	19.8	30	10.5	16.2	13.4	30	9.2	23.6	5.5	12.8	27	7.9	17
Probable error of a mean (Bu.)	—	1.2	—	1.3	0.9	0.8	—	1.3	1.0	0.8	—	0.9	1.1	1.4	0.7	—	0.9	—
Probable error of a mean (Percent)	—	5.87	—	3.48	5.60	3.30	—	5.75	5.08	3.84	—	9.57	3.70	16.70	6.53	—	10.74	—

1/ Excluding Pt. Collins because of spring germination.

Mediterranean sel. (C. I. 10086) had the lowest average yield. This strain of soft wheat is very poor at all stations except Denton. Kanred x Marquis (C. I. 11374), a very tender variety, was low in yield at several stations, especially where winterkilling was a factor. Kanred x Minturki (C. I. 10012) and Minturki x Beloglina-Buffum (C. I. 10088) both late varieties ranked 27 and 28 in the list of 30. A second Mediterranean sel. (C. I. 10085) did well at Denton but poor at all other stations.

In table 23 the 2-year average yields for each station having such data are presented and averaged by States. Data from stations having single-year results are not included. Here again the varieties are ranked in order of average yield at 7 stations or 14 station years. P1066-1 x Burbank, Kanred x Hard Federation (C. I. 10092) Termarq sel., and Kanred x Hard Federation (C. I. 10091) ranked highest and each did well in one or more states. Eleven new strains ranked above Blackhull, and 19 above Nebraska No. 60 and Kharkof.

At the bottom of the list appear the Mediterranean selections and Kanred x Marquis (C. I. 11374). Kanred x Minturki (C. I. 10012) Minturki x Beloglina-Buffum (C. I. 10088), and Turkey sel. (C. I. 10096) did very poorly.

From the yield data it is easily seen that no one variety is outstanding throughout the area. The Kanred x Hard Federation strains that do well in Kansas and south are not adapted in Nebraska because of lack of hardiness. The Turkey selections from Nebraska do poorly at Denton but fairly well at Woodward. The soft winter wheats included in the tests do well at Denton only. Strains that do well at North Platte and Alliance have been too late for most of the stations farther south. By continuing these nurseries it should be possible to select desirable material for including in plot tests in the different districts, as well as to obtain valuable information regarding characteristics influencing yield in winter wheats.

Table 23. - Summary of average yields of 30 winter-wheat varieties grown as uniform yield nurseries at 7 stations in the hard red winter wheat region for the two year period, 1932-33

Variety	C. I. No.	Texas				Oklahoma				Kansas				Nebraska				Average Bu. per acre 7 strains
		Bu. per acre		Denton	Rank	Bu. per acre		Still- water	Wood- ward	Bu. per acre		Hays	Man- hattan	Bu. per acre		Lin- coln	Alli- ance	
		C. I.	No.	Bu. per acre	Rank	Bu. per acre	Rank	Still- water	Wood- ward	Bu. per acre	Rank	Hays	Man- hattan	Bu. per acre	Lin- coln	Alli- ance		
P1066-1 x Burbank	10087	31.0	2	36.4	27.2	31.8	15	41.4	36.1	38.8	3	31.2	17.6	24.4	2	31.6	30.3	
Kanred x Hard Federation	10092	31.1	1	42.3	28.4	35.4	1	42.2	33.6	37.9	5	19.6	14.9	17.3	28	30.1	30.1	
Tennarq sel.	10089	24.2	15	39.7	26.9	33.3	4	43.3	38.4	35.0	2	27.0	14.8	20.9	19	29.7	29.7	
Kanred x Hard Federation	10091	28.6	7	38.0	24.8	31.4	29.1	38.4	32.9	39.4	1	24.4	13.4	18.9	23	29.3	29.3	
Fulhard	18257	28.2	8	34.0	27.6	33.2	27.6	37.9	32.9	36.7	1	24.8	15.6	24.2	17	29.2	29.2	
Turkey sel.	10083	25.8	12	38.9	25.2	31.6	31.6	39.0	34.7	35.4	12	22.9	19.5	21.2	22	29.0	29.0	
Kanred x Marquis	10090	28.8	6	37.7	27.5	32.7	32.7	40.0	37.9	36.7	7	20.4	18.6	19.5	17	28.6	28.6	
Kanred sel.	10099	24.5	14	37.9	27.0	31.1	33.1	42.9	36.5	36.5	16	26.0	20.8	23.0	17	28.1	28.1	
Turkey sel.	10094	19.0	24	40.3	29.0	34.7	34.7	45.5	39.5	36.8	9	27.0	18.9	23.0	16	28.5	28.5	
Do.	10100	22.4	17	33.3	27.8	32.5	32.5	42.9	37.5	36.7	23	26.6	20.6	23.6	16	28.3	28.3	
Do.	11375	17.5	21	48.0	40.3	45.5	45.5	49.5	45.5	45.5	14	27.7	21.6	27.2	17	28.2	28.2	
Blackbull	6251	21.1	19	48.0	40.3	45.5	45.5	49.5	45.5	45.5	24	29.2	23.1	23.1	15	28.1	28.1	
Kanred x Hard Federation	18373	28.0	29.7	29.7	29.7	31.2	31.2	31.2	31.2	31.2	21	24.6	16.7	16.7	15	27.3	27.3	
Early Blackhull	18856	29.6	29.5	29.5	29.5	30.7	30.7	30.7	30.7	30.7	25	24.6	13.6	21.5	21	27.0	27.0	
Kanred x Hard Federation	10093	29.7	23	45.5	43.0	47.0	47.0	49.5	45.5	45.5	14	24.7	11	19.6	21	26.7	26.7	
Turkey sel.	18895	12.5	23	45.5	43.0	47.0	47.0	49.5	45.5	45.5	13	27.1	16.4	19.6	11	26.4	26.4	
Belogrina sel.	18884	18.5	21	45.5	43.0	47.0	47.0	49.5	45.5	45.5	17	27.4	11.8	19.6	10	26.3	26.3	
Turkey sel.	10016	18.5	25	45.5	43.0	47.0	47.0	49.5	45.5	45.5	20	25.5	16.8	21.5	11	25.4	25.4	
Do.	10098	17.9	26	45.5	43.0	47.0	47.0	49.5	45.5	45.5	15	25.5	11.8	19.6	10	25.4	25.4	
Do.	10097	14.4	30	45.5	43.0	47.0	47.0	49.5	45.5	45.5	12	25.5	11.8	19.6	11	24.2	24.2	
Nebraska No. 60	10015	14.4	21	45.5	43.0	47.0	47.0	49.5	45.5	45.5	10	22	11.8	19.6	10	22.7	22.7	
Kharkof	6250	20.7	21	45.5	43.0	47.0	47.0	49.5	45.5	45.5	25	30.5	27.1	27.1	21	26.4	26.4	
Sibley No. 81	1442	21.1	19	45.5	43.0	47.0	47.0	49.5	45.5	45.5	16	26.8	9.6	18.2	18	25.4	25.4	
Kanred x Minturki	10084	26.2	23.8	25.2	25.2	25.4	25.4	24.9	24.9	24.9	30.5	27.4	27.4	27.4	21	25.4	25.4	
Minturki x Beloglina-Buffum	10012	20.7	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	23	30.5	27.6	27.6	21	24.2	24.2	
Turkey sel.	10088	20.9	15.1	32.8	32.8	32.8	32.8	32.8	32.8	32.8	28	35.1	29.0	33.4	27	23.7	23.7	
Mediterranean sel.	10096	15.1	15.1	32.8	32.8	32.8	32.8	32.8	32.8	32.8	28	35.1	29.0	33.4	27	23.7	23.7	
Do.	10085	30.4	3	26.2	26.2	26.2	26.2	26.2	26.2	26.2	10	26.7	11.4	17.6	11	21.8	21.8	
Kanred x Marquis	10086	26.2	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	21	30.4	29.4	33.0	25	22.7	22.7	
	11374	20.7	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21	33.0	33.0	33.0	30	22.7	22.7	

SUMMARY OF AGRONOMIC DATA

In table 24 are shown the averages for the data on characters other than yield. The number of stations entering the averages is shown at the top of each column.

For winter survival the averages from 7 stations showed a narrow range. However, Kanred x Marquis (C. I. 11374) was lowest, followed by Early Blackhull and Sibley No. 81. Nebraska No. 60 and Kanred x Minturki (C. I. 10012) were the most hardy.

For date of heading Early Blackhull was the earliest, being 3 to 5 days earlier than the Kanred x Hard Federation strains. Kanred x Minturki (C. I. 10012) and Minturki x Beloglina-Buffum had the latest date of heading.

Test weights obtained at 3 stations were low, with Early Blackhull averaging the heaviest.

Table 24. - Summary of agronomic data, other than yield, for the 30 varieties of winter wheat grown as uniform yield nurseries at 10 stations in the hard red winter wheat region, 1933

Variety	C. I. No.	Average				
		Winter sur- vival	Date Head- ed	Ripe	Height	Test weight per bu.
Number of stations		7	9	7	10	3
		(P.ct.)		(Ir.)		(Lbs.)
Kharkof	1442	84.7	5-25	6-23	29.8	55.0
Blackhull	6251	75.3	5-22	6-23	31.1	58.5
Nebraska No. 60	6250	85.7	5-25	6-24	30.4	55.6
Early Blackhull	8356	70.4	5-13	6-19	30.3	59.7
Turkey sel.	10083	79.7	5-24	6-23	30.4	55.4
Sibley No. 81	10084	70.6	5-24	6-23	31.7	57.6
Mediterranean sel.	10085	70.9	5-22	6-18 ²	30.9 ³	57.3
Do.	10086	71.3	5-24	6-24	30.4 ³	55.8
Kanred x Marquis	11374	63.9	5-20	6-22	29.0	56.8
P1066-1 x Burbank	10087	78.1	5-22	6-22	29.7	57.0
Beloglina scl.	8884	81.1	5-25	6-23	30.1	54.9
Kanred x Minturki	10012	84.9	5-26	6-24	30.9	51.8
Minturki x Beloglina-Buffum	10013	84.1	5-26	6-24	31.2	52.7
Tenmarq sel.	10089	73.9	5-21	6-23	30.5	55.1
Fulhard	8257	77.4	5-21	6-23	31.4	58.6
Kanred x Marquis	10090	74.9	5-23	6-22	32.0	51.5 ¹
Kanred x Hard Federation	11373	73.0	5-18	6-22	29.4	58.3
Do.	10091	74.6	5-17	6-21	28.7	58.1
Do.	10092	73.6	5-18	6-22	29.7 ³	57.8
Do.	10093	78.3	5-16	6-21	28.6	57.9
Turkey sel.	10015	82.7	5-23	6-23	29.9	58.1
Do.	10016	80.9	5-21	6-22	29.4	57.4
Do.	10094	82.4	5-23	6-22	29.1	57.3
Do.	10095	81.3	5-24	6-23	29.0	57.4
Do.	10096	81.3	5-22	6-23	28.5	57.7
Do.	10097	80.1	5-23	6-22	29.5	57.3
Do.	10098	84.6	5-21	6-21	29.1	57.1
Kanred sel.	10099	82.6	5-24	6-23	30.5	52.3
Turkey sel.	10100	81.6	5-23	6-21	30.6	52.7
Do.	11375	81.9	5-25	6-21	30.3	56.5

1/ 2 stations only

2/ 6 stations only

3/ 9 stations only

DATA FROM THE DISEASE NURSERIES

BUNT NURSERY

For convenience a copy of the data from the uniform winter-wheat bunt nursery is included in this report. The data are presented in table 25.

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry

SUMMARY OF UNIFORM WINTER WHEAT-BUNT NURSERY, 1932-33

By H. A. Rodenhiser, pathologist, and K. S. Quisenberry, agronomist, Wheat Investigations, Division of Cereal Crops and Diseases.

As a part of the hard red winter wheat improvement program in the Great Plains area, a study is being made of the varietal resistance of the important varieties to stinking smut. This report summarizes the results obtained the second year, 1932-33, together with averages for the two years, 1932 and 1933.

Fifty varieties and strains were seeded in duplicate 8-foot rows at 12 stations in the fall of 1932. The material included strains that showed resistance the previous year and newer strains that were being tested for the first time.

Before inoculation the seed was treated with formaldehyde and thoroughly washed in water. When dry, the seed for each station was heavily smutted with inoculum from the particular station at which the seeding was to be made. The inoculum for each station was obtained from the previous year's nursery at that station. Bunted heads were collected from all varieties showing infection. The smut used in all these tests was Tilletia levis, the smooth-spored species.

The results obtained from 6 of the nurseries are recorded in table 25. No significant results were obtained at Denton, Texas, due to poor infection, nor at Alliance, Nebr., due to winter killing. At North Platte, Nebr., Brookings, S. Dak., and Moccasin and Bozeman, Mont., the nursery was completely winter killed.

The varieties are listed in table 1 in the order of their susceptibility in these tests. The average percentage of infection ranged from 0 to 58.0. Thirty of the varieties developed less than 10 percent of smut and of these Beloglina x Hussar, C. I. No. 11513, showed no infection; 12 other varieties had averages of less than 1 percent. The Nebraska Turkey selections again maintained their resistance, as did Hussar, Ridit, Minturki, and Ioturk.

In table 1 there is also recorded the average infection obtained in 1932, together with the 2-year average for the varieties grown both years. While there is some variation in the results for the different years, the results are fairly consistant.

October 12, 1933.

Table 25. Summary of bunt infection on 50 varieties and strains of wheat grown in the uniform winter-wheat bunt nursery at 6 stations in the Great Plains area, 1932-33, and the average bunt infection for 1932 and 1933

Variety	C. I. no.	Average percentage of bunt at -						Av. at six stations 1933	8 sta- tions 1932	Average 2-yr average
		Ama- rillo Tex.	Still- water, Okla.	Wood- ward, Okla.	Man- hattan Kans.	Lin- coln Neb.	Akron Colo.			
Beloglina x Hussar	11513	0	0	0	0	0	0	0	-	-
Hussar	4843	0	0	0.5	0.3	0	0.5	0.2	0.8	0.5
Turkey sel. (Nebr.)	11506	0	0	0.2	0.4	0.5	0.9	0.3	0.5	0.4
Do.	11507	0	0	0.4	0.7	0	0.8	0.3	-	-
Do.	10016	0	0.4	0.9	0.8	0.6	0	0.5	0.8	0.7
Do.	10095	1.7	0	0.5	0.9	0	0	0.5	0.7	0.6
Do.	10098	0	0.2	0.6	1.4	0.7	0	0.5	1.1	0.8
Do.	10094	0	0	1.7	0.7	0	1.3	0.6	1.9	1.3
Do.	10097	0	0	0	0.3	2.2	0.9	0.6	0.5	0.6
Ridit	6703	0	0	3.7	0.9	0	0	0.8	1.7	1.3
Minturki	6155	0	0	0.5	1.2	2.3	1.2	0.9	5.7	3.3
Ioturk	11388	3.6	0	1.3	0.7	0	0	0.9	-	-
Beloglina x Hussar	11514	2.7	0	0.4	0.7	0	1.8	0.9	-	-
Yogo	8033	4.4	0	1.6	0.1	0	0	1.0	1.7	1.4
Cooperatorka	8861	1.6	0	1.7	2.7	0	0.7	1.1	2.9	2.0
Turkey sel. (Nebr.)	10015	2.4	1.5	2.4	1.4	0	0.5	1.4	4.5	3.0
Sibley No. 81	10084	4.8	0	3.0	0	0.4	1.3	1.6	1.4	1.5
Minturki x Beloglina-Buffum	10088	0	0.3	4.8	2.0	2.3	.3	1.6	2.1	1.9
Turkey sel. (Nebr.)	10096	2.2	1.1	5.6	1.3	0	2.7	2.2	2.3	2.3
Turkey sel. (Colo.)	10100	2.0	0.2	2.2	6.1	0	2.7	2.2	4.9	3.6
Turkey	11376	11.1	0	0.9	1.0	0	0	2.2	-	-
Kanred x Sherman	11510	0	1.2	5.8	4.6	0	1.8	2.2	3.7	3.0
Beloglina sel.	10013	0	0	1.3	10.3	4.6	2.2	3.1	5.7	4.4
Turkey x Bd. Minnesota No. 48	8243	2.6	2.1	6.4	3.5	1.6	4.7	3.5	2.4	3.0
Rio	10061	1.5	1.3	12.0	2.3	5.7	0	3.8	-	-
Beloglina x Minturki	11515	0	0.6	4.5	1.1	12.2	4.6	3.8	-	-
Kruse	11524	5.4	4.6	4.6	5.3	5.1	0	4.2	-	-
Oro	8220	3.8	5.0	9.1	5.3	1.1	7.7	5.3	4.7	5.0
Minturki x Blackhull	11520	12.2	8.1	12.2	11.9	7.7	6.1	9.7	-	-
Zenka	11522	6.3	2.0	17.1	6.0	10.4	17.3	9.9	-	-
Minturki x Blackhull	11519	20.8	9.0	19.3	9.6	9.7	7.0	12.6	-	-
"Enid strain"	11508	27.3	14.9	25.2	15.2	12.8	24.7	20.0	-	-
Quivira	8886	32.5	8.5	45.9	30.3	25.4	21.1	27.3	32.0	29.7
Marquis x Kanred	11517	30.9	12.5	39.0	23.0	43.6	23.6	28.8	-	-
Sibley No. 62	11523	52.0	15.2	41.8	11.5	31.0	22.0	28.9	-	-
Marquis x Kanred	11518	33.0	16.5	38.4	26.8	41.2	26.6	30.4	-	-
Do.	11516	36.0	18.7	42.4	32.5	31.2	28.6	31.6	-	-
Kharkof	1442	35.3	19.3	51.8	37.7	24.8	23.8	32.1	46.1	39.1
Mediterranean sel.	11525	32.4	8.6	56.6	29.8	14.8	51.1	32.2	-	-
Cheyenne	8885	28.4	20.4	48.8	26.2	32.4	38.9	32.5	44.3	38.4
Kanred x Marquis	10090	51.1	19.7	49.6	27.2	22.7	27.9	33.0	-	-
Fulhard	8257	38.0	21.8	47.7	35.3	28.2	41.2	35.4	-	-
Vaughn Turkey	11509	22.5	20.9	70.2	46.4	27.3	35.6	37.2	-	-
Tenmarq sel.	10089	60.0	19.3	55.5	38.3	20.3	32.4	37.6	-	-
Mediterranean sel.	11526	52.3	12.9	51.5	39.8	15.3	54.7	37.8	-	-
Tenmarq x Nebr. No. 28	11521	55.0	18.8	47.4	32.6	41.0	41.9	39.5	-	-
Clark's No. 40	8858	60.1	12.2	58.9	47.6	39.3	40.6	43.1	-	-
Kanred x Hard Federation	10091	51.0	19.3	55.0	32.5	78.5	39.3	45.9	-	-
Early Blackhull	8856	84.6	26.8	52.1	41.2	40.9	33.5	46.5	-	-
Kanred x Hard Federation	10093	75.9	21.7	69.6	45.6	77.0	58.2	58.0	-	-
Average infection	---	18.9	7.3	21.5	14.1	14.3	14.7	-	-	-

DISEASE GARDEN

The table 26 a summary is given of the data obtained in the disease garden at Manhattan, Kans. This disease garden is conducted by C. O. Johnston and the data are presented through his kindness.

Table 26. - Reaction of 50 varieties and selections of winter wheat to bunt, loose smut, leaf rust and mildew, Manhattan, Kansas, 1933

Variety	C. I. No.	Smut		Leaf rust (Percent)	Coefficient 1/ of infection for mildew
		Covered	Loose		
Kharkof	1442	27.70	0	25	4 +
Kharkof (Hays No. 2)	6686	37.93	0	25	4 +
Kanred	5146	44.44	0	15	4 +
Kanred sel.	10099	40.31	0	15	4 +
Tenmarq	6936	66.11	0	20	4 +
Quivira	8886	71.26	0	tr	4 +
Kanred x Hard Federation	11373	64.36	0	5	4 +
Kanred x Hard Federation	10091	74.31	0	2	4 +
Kanred x Hard Federation	10092	83.01	0	2	4
Kanred x Hard Federation	10093	71.55	0	2	4
Blackhull	6251	45.83	0	15	4 +
Kanred x Marquis	11374	59.23	0	5	4
P1066-1 x Burbank	10087	17.14	0	20	4 +
Turkey sel.	10100	7.86	0	25	4
Cheyenne	8885	44.55	0.50	35	4
Oro	8220	2.20	0	25	4
Minturki	6155	10.90	0	25	4 +
Nebraska No. 60	6250	48.66	0	35	4
Yugo	8033	0	0	35	4 +
Minhardi x Minturki	8215	9.44	2.10	25	3 +
Cooperatorska	8861	9.52	0	25	3 +
Nebraska No. 28	5147	14.81	0	20	4
Turkey sel. Okla.	10083	36.00	0	35	4
Turkey sel. Nebr.	10015	5.02	0	40	4
Turkey sel. Nebr.	10016	2.60	0	35	3 +
Turkey sel. Nebr.	10094	3.50	8.42	35	3 +
Turkey sel. Nebr.	10095	1.04	6.30	35	4
Turkey sel. Nebr.	10096	3.67	3.34	35	3 +
Turkey sel. Nebr.	10097	0.92	0.92	35	3 +
Turkey sel. Nebr.	10098	5.04	0.31	35	3 +
Kanred x Minturki	10012	62.33	0	25	3
Minturki x Beloglina-Buffum	10088	1.80	0	35	4
Turkey x Bd. Minn. No. 48	8243	2.03	0	40	4
Kanred x Marquis	10090	51.54	0	tr	3
Kawvale	8180	52.22	0	tr	3
Iowin	10017	70.27	0	5	2
Sibley No. 81	10084	2.04	0.51	5	4
Denton	8265	50.97	1.45	tr	2
Early Blackhull	8856	78.51	0	10	4
Mediterranean sel.	10085	38.83	0.34	tr	2
Mediterranean sel.	10086	41.93	0	tr	2
Mediterranean sel.	11525	42.85	0	tr	4
Sibley No. 62	11523	61.73	0	25	4 +
Tenmarq sel.	10089	42.85	0	35	4 +
Fulhard	8257	35.22	0	35	4 +
Turkey sel.	11375	16.16	0	45	4
Turkey sel.	11506	0	0	45	4 +
Turkey sel.	11507	4.87	0	25	4 +
"Enid Strain"	11508	20.00	0	15	4 +
Kruse	11524	0	0	20	4 +

1/ Mildew coefficients were recorded in ranges of severity as follows:

2 = light

3 = moderately severe

3 + = severe

4 = very severe

4 + = extremely severe